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FINAL RCRA FACILITY INVESTIGATION FOR PARCEL D AND BACKGROUND STUDY
HEALTH AND SAFETY PLAN NAS FORT WORTH TX
8/1/1996
JACOBS ENGINEERING



**NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 382



United States Air Force Air Force Base Conversion Agency

FINAL

NAS Fort Worth JRB, Texas
(Formerly Carswell AFB, Texas)

RCRA FACILITY INVESTIGATION
FOR PARCEL D AND
BACKGROUND STUDY

HEALTH AND SAFETY PLAN

AUGUST 1996



United States Air Force Air Force Base Conversion Agency

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**RCRA FACILITY INVESTIGATION
FOR PARCEL D AND BACKGROUND
STUDY**

HEALTH AND SAFETY PLAN

AUGUST 1996

By:



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ACRONYMS AND ABBREVIATIONS

ACC	Air Combat Command
ACGIH	American Conference of Governmental Industrial Hygienists
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AIHA	American Industrial Hygiene Association
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
COR	Contracting Officer's Representative
CPR	cardiopulmonary resuscitation
CS	Corporate Safety
DBCRA	Defense Base Closure and Realignment Act
DOT	U.S. Department of Transportation
EH&S	environmental health and safety
EPA	U.S. Environmental Protection Agency
F	Fahrenheit
HNu	photoionization meter
HSP	Health and Safety Plan
IRP	Installation Restoration Program
I-30	Interstate Highway I-30
Jacobs	Jacobs Engineering Group Inc.
JRB	Joint Reserve Base
MSDS	Material Safety Data Sheet
msl	mean sea level
NAS	Naval Air Station
NIOSH	National Institute for Occupational Safety and Health
OMC	occupational medical consultant
OSHA	U.S. Occupational Safety and Health Administration
PHSD	Project Health and Safety Director
PHSM	Program Health and Safety Manager

ACRONYMS AND ABBREVIATIONS

PID	photoionization detector
PjM	Project Manager
POC	point of contact
PPE	personal protective equipment
QAPP	Quality Assurance Project Plan
QPP	Quality Program Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SAC	Strategic Air Command
SAP	Sampling and Analysis Plan
SCBA	self-contained breathing apparatus
SHSC	Site Health and Safety Coordinator
SOPs	standard operating procedures
SWMU	solid waste management unit
TBD	to be determined
TSDF	treatment, storage, and disposal facility
WSA	Weapons Storage Area
°	degrees

1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been written for use by Jacobs Engineering Group Inc. (Jacobs) and any other individuals authorized to access areas where site control is established to conduct fieldwork. It may also be used as a guidance document by properly trained and experienced personnel. However, Jacobs does not guarantee the health and safety of any person entering this site. Because of the nature of this site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered; however, a summary of suspected hazards is listed in Table 1-1. Strict adherence to the health and safety guidelines stated in this HSP will reduce, but not eliminate, the potential for injury on the site. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety professionals.

Jacobs has prepared this HSP for the Basewide and Offsite Weapons Storage Area (WSA) background studies and former base hospital preliminary assessment (PA). This HSP will be updated on completion of the PA if a Resource Conservation and Recovery Act (RCRA) Remedial Facility Investigation (RFI) of the former base hospital is required at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Carswell Field, Fort Worth, Texas (Figure 1-1). This station was formerly called Carswell Air Force Base (AFB), and will be referred to in this document as NAS Fort Worth. The HSP constitutes one of the planning documents required by the Statement of Work for Contract F41624-94-D-8046, Delivery Order 0021, issued to Jacobs by the Air Force Center for Environmental Excellence (AFCEE). Other planning documents prepared for this contract and delivery order include the Sampling and Analysis Plan (SAP) and the Work Plan.

This HSP will be kept onsite during field activities and will be reviewed and updated as necessary to reflect current site conditions and operations. This HSP requires that

TABLE 1-1

Summary of Suspected Hazards

Tasks	Physical ¹	Chemical ²	Biological ³	Air Monitoring ⁴	Initial Entry PPE ⁵
Mobilization	<ul style="list-style-type: none"> • manual lifting • uneven surfaces • overhead utilities • vehicle accidents 	<ul style="list-style-type: none"> • not expected 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • possible screening 	D
Utility Clearance	<ul style="list-style-type: none"> • manual lifting • uneven surfaces • aboveground and belowground utilities • sunlight; UV exposure • flying objects/debris 	<ul style="list-style-type: none"> • fuels • waste oils 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • initial screening with PID 	D
Hand augering					
Asphalt or cement coring					
Geophysical tracing					
Subsurface soil sampling	<ul style="list-style-type: none"> • slips, trips, falls • noise • electrical 	<ul style="list-style-type: none"> • none expected 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • PID 	D
Groundwater monitoring well installation	<ul style="list-style-type: none"> • slips, trips, falls • heavy equipment • noise • electrical • underground and aboveground utilities • manual material handling • heat stress • overhead hazards 	<ul style="list-style-type: none"> • TCE, possible radium near WSA 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • PID • Screening of well construction cuttings with direct-reading radiation detection instrument. No air monitoring unless above action level. 	D

TABLE 1-1

Summary of Suspected Hazards

Tasks	Physical ¹	Chemical ²	Biological ³	Air Monitoring ⁴	Initial Entry PPE ⁵
Groundwater sampling	<ul style="list-style-type: none"> • slips, trips, falls • manual material handling • upper extremity strain • electrical • heat stress 	<ul style="list-style-type: none"> • TCE, possible radium near WSA 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • PID 	D
Surface water and sediment sampling	<ul style="list-style-type: none"> • slips, trips, falls • heat stress 	<ul style="list-style-type: none"> • none expected 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • PID 	D
Soil sample collection	<ul style="list-style-type: none"> • belowground utilities • uneven surfaces • sunlight; UV exposure • traffic • flying objects/debris • noise 	<ul style="list-style-type: none"> • fuels • waste oils • TCE, possible radium near WSA 	<ul style="list-style-type: none"> • insects • rodents • reptiles 	<ul style="list-style-type: none"> • PID 	D

¹ Physical hazards and controls are listed in Table 3-2.

² Chemical hazards by sites and an exposure summary are in Tables 3-3 and 3-4.

³ Additional information on the biological hazards is in Appendix D.

⁴ Monitoring equipment and action levels are in Table 5-2.

⁵ Personal Protective Equipment information can be found in Section 6.0.

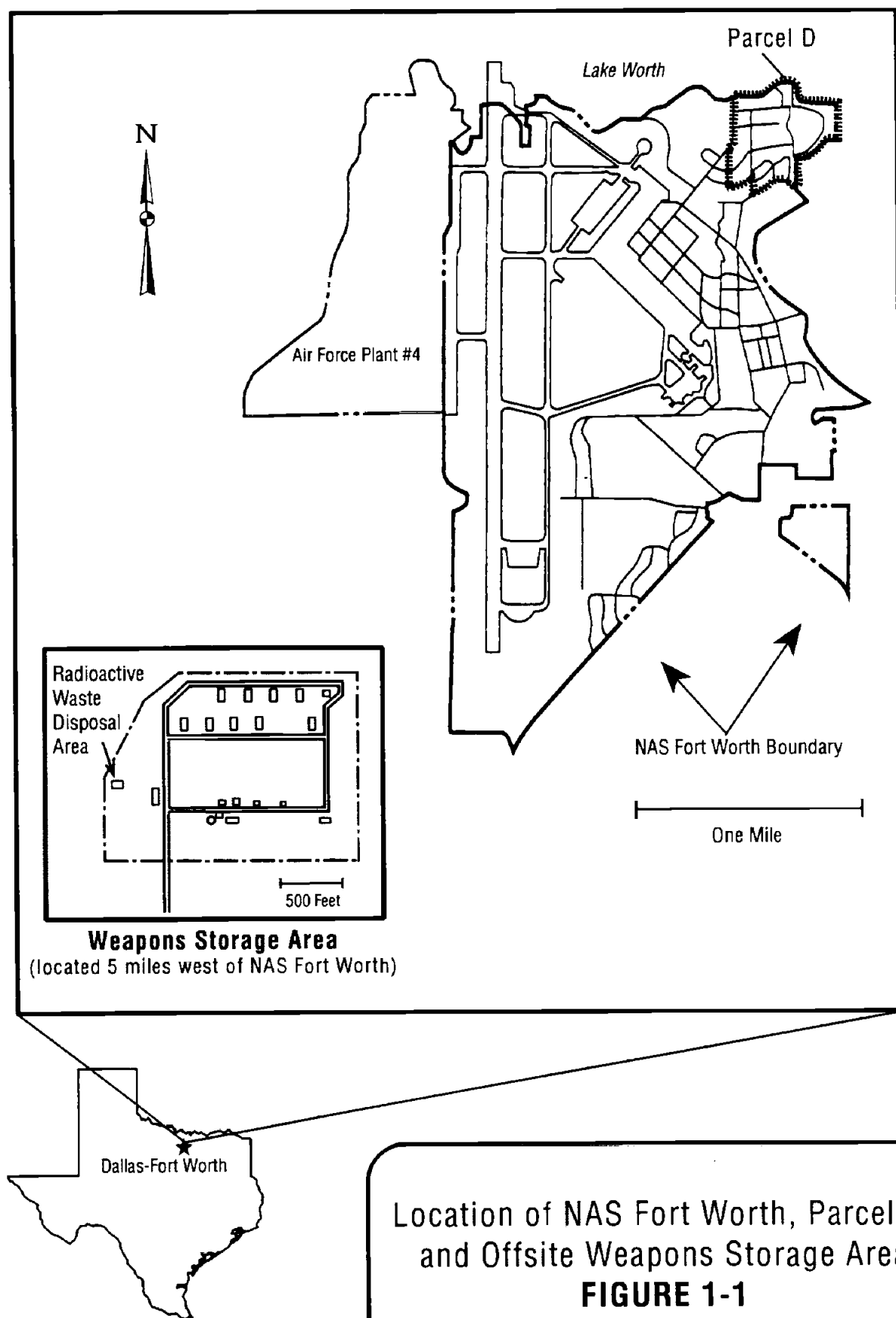
PID = photoionization detector

PPE = personal protective equipment

TCE = trichloroethylene

UV = ultraviolet

WSA = Weapons Storage Area



the Program Health and Safety Director (PHSD) and Project Health and Safety Manager (PHSM) shall be familiar with the following:

- applicable federal, state, and local regulations;
- standard operating procedures (SOPs) contained in the Jacobs Environmental Health and Safety (EH&S) Manual (Jacobs undated a) and Jacobs Corporate Safety (CS) Manual (Jacobs undated b) (these manuals will be available at the site office);
- requirements found in the AFCEE Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS) (U.S. Air Force 1993);
- requirements found in the U.S. Army Corps of Engineers (COE) Safety and Health Requirements Manual (COE 1992); and
- procedures contained in the Work Plan for this project and Quality Assurance Project Plan (QAPP) for the project.

In addition to this HSP, each subcontractor is expected to have its own health and safety program covering its own specific operational activities, e.g., drilling. In any case, where overlaps or conflicts occur between requirements in this HSP and a subcontractor's health and safety procedures, the requirement that is most protective of the employee's health and safety will take precedence.

The overall intent of this HSP is to create a site health and safety program that effectively identifies, evaluates, controls, and reduces health and safety hazards.

This HSP is written for the site conditions, purposes, dates, and personnel specified and must be amended if these conditions change. Jacobs claims no responsibility for use of this plan by others.

1.1 OBJECTIVES

Jacobs will complete a basewide background study and a background study at the WSA, including surface and subsurface soil sampling, soil borings, groundwater

monitoring well installation, and groundwater, surface water, and sediment sampling. Additionally, Jacobs will complete a PA and an RFI for the former base hospital.

1.2 NAS FORT WORTH DESCRIPTION AND HISTORY

The following sections describe the site and its history.

1.2.1 Site Description

NAS Fort Worth is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth. The station property, totaling 2,555 acres, consists of the main station and two noncontiguous parcels. The main station comprises 2,264 acres and is bordered by Lake Worth to the north, the West Fork of the Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and Air Force Plant 4 to the west. The area surrounding NAS Fort Worth is mostly suburban, including the residential areas of the cities of Fort Worth, Westworth Village, and White Settlement.

The existing land uses in the immediate vicinity of the station include industrial, commercial, residential, and recreational. The land uses west of the station are predominantly residential and industrial. These include single-family residences, supporting commercial centers, Air Force Plant 4, and an industrial complex in White Settlement.

The predominant development south of the station is the commercial area located at the Interstate Highway I-30 (I-30) and State Highway 183 interchange. This area includes a discount-oriented retail center, a regional shopping mall, and a convenience center.

Various types of residential development occur southeast of the station, north of I-30. Single-family housing is also found on the eastern side of the station, from the Kings Branch housing tract north to Meandering Road.

Public/recreational land uses occur north of the station, surrounding Lake Worth. Public access along the southern shore of Lake Worth is currently restricted because of NAS Fort Worth activities. A fish hatchery, YMCA camp, and private recreation lands are located along the West Fork of the Trinity River, northeast of the station.

The area surrounding the WSA is primarily rural. A residential development is located south of White Settlement Road.

NAS Fort Worth is located within the Grand Prairie section of the Central Lowlands Physiographic Province. The area is characterized by broad terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The topography of the station is fairly flat, except for areas near Farmers Branch Creek and the Trinity River. Elevations average 650 feet above mean sea level (msl) and range from 550 feet above msl in the east to 690 feet above msl in the southwest.

The climate in the Fort Worth region is subhumid with mild winters and hot, humid summers. The average annual precipitation is 31.5 inches, with the majority falling between April and October. The average annual temperature is 66 degrees Fahrenheit (° F). July is the hottest month with an average monthly temperature of 86° F, while January is the coldest month with an average monthly temperature of 45° F. Temperature changes are rapid and often change 20° to 30° in several hours. The average annual relative humidity is 63 percent.

Prevailing winds are primarily southerly from March through November and northerly from December through February; the average wind speed is 8 knots. Severe thunderstorms with windspeeds of 65 knots and hail storms are common. Climate

conditions in summer make tornado formations possible, although there is more property damage each year as a result of hail than tornadoes.

1.2.2 Site History

In 1984, the IRP was initiated at NAS Fort Worth and began with a program records search conducted by CH2M Hill, Inc. Since 1984, Air Force IRP studies have been conducted by several contractors and have focused on the identification and characterization of waste disposal areas and solid waste management units (SWMUs) identified in the installation's RCRA Part B permit.

Pursuant to the Defense Base Closure and Realignment Act (DBCRA) of 1990, Carswell AFB was selected for closure and associated property disposal during Round II Base Closure Commission deliberations. This announcement initiated the closure and the disposal and rescue planning processes. Drawdown activities were initiated in 1992 and all 7 Bomb Wing aircraft were relocated by January 1993. The station officially closed on 30 September 1993. On 01 October 1994, the U.S. Navy assumed responsibility for the former Carswell AFB. The base was renamed NAS Fort Worth. The 1993 DBCRA decisions have further impact on the realignment and partial disposal of property.

The area now known as NAS Fort Worth was originally a modest dirt runway built to service an aircraft manufacturing plant located where Air Force Plant 4 is now. When it was established in 1942, the installation was referred to as the Tarrant Field Airdrome and was originally under the jurisdiction of the Gulf Coast Army Air Field Training Command. Its mission was to provide transition training for the B-24 bomber pilots, and served as a heavy bomber base until closure. The Strategic Air Command (SAC) assumed control of the installation in 1946 and the station served as headquarters for the Eighth Air Force. The station was renamed Carswell AFB in 1948 in honor of Fort Worth native, Major Horace S. Carswell. At that time, the 7 Bomb Wing became the base host unit. In 1951, Headquarters 19 Air Division was

located at Carswell AFB where it remained until September 1988, the longest tenure of any air division in SAC. Carswell AFB became home base for its first B-52s and KC-135s in 1956. The Air Combat Command (ACC) assumed control of the base in 1992 with the disestablishment of SAC.

The majority of the station property was acquired in the 1940s, with most of the property acquired from the city of Fort Worth in 1941; additional property including most of the south station, the hospital area, and the Offsite WSA was acquired during the 1950s. Kings Branch and south station residential areas were acquired in 1960. Several miscellaneous additional properties totaling less than 10 acres have been acquired since 1970.

1.3 DESCRIPTION OF FIELD ACTIVITIES

This project can be broken down into the following tasks:

- site mobilization;
- surface water and sediment sampling;
- surface soil sampling;
- subsurface soil sampling;
- groundwater monitoring well installation; and
- groundwater sampling.

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2.0 FIELD OPERATIONS ADMINISTRATION

The following sections describe the project organization and health and safety responsibilities.

2.1 PROJECT ORGANIZATION

Project Manager (PjM)	Lynn Schuetter	(303) 595-8855
AFCEE Contracting Officer's Representative (COR)	Charles Rice	(210) 536-6452
Base Conversion Activity Coordinator	Olen Long	(817) 731-8284
Base Engineering Technician	Alan Flolo	(817) 731-8973 extension 18
Program Manager	Warner Reeser	(303) 595-8855
PHSD	Terry Briggs	(303) 595-8855
PHSM	to be determined (TBD)	

2.2 FIELD TEAM PERSONNEL

The field team members will be listed in the HSP after they are determined.

2.3 PERSONNEL RESPONSIBILITIES

The following sections delineate the responsibilities of personnel associated with this project.

2.3.1 Project Personnel

The following personnel are directly responsible for health and safety procedures for this project.

Project Manager. The PjM is responsible for coordinating overall planning of work and coordinating supervision of work.

Project Health and Safety Manager. The PHSM has the following responsibilities:

- administers this HSP;
- verifies current certifications of individuals' medical fitness, training, and respirator fit per Section 2.4, before authorizing access to areas where site control is established;
- conducts emergency planning action items per Section 7.1;
- arranges for health and safety equipment to be available onsite in accordance with this HSP;
- conducts employee health and safety communications per Section 2.6 before the start of field activities;
- oversees the performance of site health and safety coordinators (SHSCs) who work with specific crews, e.g., the geologist at a drilling site may be an SHSC;
- establishes and enforces site controls per Section 4.0;
- conducts periodic inspections of work practices to determine effectiveness of this HSP (deficiencies are noted and reported to the PjM and PHSD);
- assists in independent health and safety site audits conducted by Jacobs corporate personnel, the regulatory agencies, or the client;
- conducts accident investigations of injuries, illnesses, and other incidences;
- has "stop-work authorization" when an imminent hazard or potentially dangerous work practice exists; and
- completes and submits record keeping forms per this HSP and corporate SOPs.

2.3.2 Staff Health and Safety Professionals

The following personnel will provide support for health and safety issues on this project.

Program Health and Safety Director. The PHSD is responsible for the following:

- oversees development and implementation of the health and safety program;
- provides project personnel with technical guidance for conducting fieldwork in a safe and healthful manner;
- assists with preparation and/or reviews and approves site-specific HSPs; and
- conducts field audits as necessary and in accordance with Jacobs' policies and procedures.

Occupational Medical Consultant. The Occupational Medical Consultant (OMC) prescribes and interprets results of medical examination protocols and testing for Jacobs employees who participate in the Jacobs Occupational Medical Program.

2.4 EMPLOYEE MEDICAL SURVEILLANCE

The PHSM shall authorize individuals to access areas where site control is established (to conduct fieldwork in accordance with this HSP only) if current certification of medical fitness, training, and respirator fit are in accordance with 29 Code of Federal Regulations (CFR) 1910.120. Copies of certifications shall be on file. (Refer to the Jacobs Corporate EH&S Manual [Jacobs undated a], Sections 3.0 and 5.0.)

Employees of teaming partners and subcontractors will provide documentation of their participation in a medical surveillance program before fieldwork begins. Documentation will be maintained in the project files.

At this time, additional medical tests will not be performed before site entry.

2.4.1 Baseline or Preassignment Monitoring

Before being assigned to a hazardous or potentially hazardous activity involving exposure to toxic materials, each employee must receive a preassignment or baseline physical examination. The content of the examination is to be determined by the employers' medical consultant. As suggested by National Institute for Occupational

Safety and Health (NIOSH)/Occupational Safety and Health Administration (OSHA)/U.S. Coast Guard/U.S. Environmental Protection Agency (EPA) *Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities* (U.S. Department of Health and Human Services 1985), the minimum medical monitoring requirements for work at NAS Fort Worth are as follows:

- complete medical and work histories;
- physical examination;
- pulmonary function test, forced vital capacity and forced expiratory volume;
- chest X ray;
- electrocardiogram;
- eye examination and visual acuity;
- audiometry;
- urinalysis; and
- blood chemistry, including hematology and serum analyses.

At present, no additional testing for specific contaminant health effects is required.

The preassignment physical examination should categorize employees as fit for duty and able to wear respiratory protection.

2.4.2 Annual Monitoring

In addition to the baseline physical examination, all employees are required to obtain an annual physical exam, unless the advising physician believes a shorter interval is appropriate. The employers' medical consultant will prescribe an adequate physical examination that meets OSHA 29 CFR 1910.120 requirements. The preassignment medical monitoring criteria outlined previously may be applicable.

All personnel working in contaminated or potentially contaminated areas at NAS Fort Worth will verify that their medical monitoring is current (within 12 months). Jacobs'

subcontractors will have documentation onsite specifying all employees are fit for duty. Each certificate will be signed by an attending physician.

2.4.3 Exit Physical

Enrollment in the medical monitoring program will end when the employee terminates the program or the company. At that time, an exit examination for the employee is required. Each employee will undergo an exit physical examination unless written documentation waiving this requirement is provided.

2.4.4 Exposure/Injury/Medical Support

As follow-up to an injury or a possible exposure above an established exposure limit, all employees are entitled and encouraged to seek medical attention and physical testing. Depending on the type of exposure, it is critical to perform follow-up testing within 24 to 48 hours. It will be up to the employers' medical consultant to advise the type of test or tests required to accurately monitor for exposure effects.

2.5 TRAINING

Training records and training content are maintained for Jacobs employees by the Jacobs Medical and Training Coordinator in Jacobs' Denver Office. Only personnel with documentation in compliance with the training requirements of 29 CFR 1910.120 will enter exclusion zones.

Employees of teaming partners and subcontractors will provide documentation of required training before the start of fieldwork. The PHSM will maintain onsite documentation of training status for each field worker including subcontractors and visitors to exclusion zones.

2.6 COMMUNICATION

If health and safety concerns arise during field activities, the steps below should be followed:

- Health and safety concerns in the field shall be brought to the attention of the PHSM.
- Health and safety field concerns that the PHSM are unable to address satisfactorily shall be brought to the attention of the PHSD.
- In the event of an accidental incident or emergency, responsible personnel shall be notified per Section 7.7.

2.6.1 Hazard Communication

To satisfy the training and hazard communication requirements of 29 CFR 1910.120, field team members shall be provided a copy of this HSP and agree to abide by it by signing the signoff sheet in Appendix A. A Hazard Communication Form shall also be signed by field team members. (Refer to Appendix B.)

2.6.2 Employee Health and Safety Briefing

The PHSM shall conduct a health and safety briefing before authorizing individual access to areas where site control is established. The PHSM shall document attendance and the topics discussed, including at least the following:

- work plan and individual assignments;
- potential hazards of the work to be performed (Section 3.0 and Appendices C and D);
- site controls and air monitoring action levels that will be in effect onsite;
- personal protective equipment (PPE) to be used;
- communication procedures, including evacuation/emergency signals; and
- emergency response/contingency plan and rescue operations.

2.6.3 Daily Tailgate Meetings

The PHSM shall conduct *daily* health and safety tailgate meetings before field team personnel perform fieldwork. The PHSM shall document attendance (using the form in Appendix E) and the topics discussed, including at least the following:

- any potential hazards of the work to be performed that were not previously discussed;
- discussion and resolution of any health and safety concerns or problems since the previous tailgate meeting; and
- evacuation routes and emergency signals warnings.

Daily meetings may be augmented by additional meetings if warranted. The daily meeting combines the pre- and post-workday meeting required by COE's Safety and Health Requirements (EM 385.1.1).

2.7 DESCRIPTION OF SUBCONTRACTORS

Specific subcontractors will be identified before the start of fieldwork. Subcontractors who will be working onsite must present certification to the PHSM that they are trained in accordance with hazardous waste laws, have been approved by a physician for hazardous waste work, and are fit to wear a respirator. A copy of this HSP will be given to potential subcontractors. Before working onsite, subcontractors shall agree to abide by this HSP by signing the signoff sheet in Appendix A.

The PHSM will inform the subcontractor's site manager of any health and safety violations. Under certain conditions, such as personnel not equipped with the proper PPE, the PHSM may stop subcontractors from working and may seek to terminate the contract.

2.8 VISITORS

Visitors to this site are required to read and understand this HSP, and to verify to the PHSM their training and participation in a medical surveillance program. Forms in Appendices A and F must be signed by each visitor.

Once this signing is complete and the visitor is wearing the required PPE, the visitor may enter the exclusion zone. However, in most cases visitors will be limited to the control zone or support zone. Visitors will be escorted by a site representative.

3.0 HAZARD EVALUATION AND CONTROL

The following sections describe the types of hazards expected on this project and the methods that will be used to control those hazards.

3.1 RISK ANALYSIS

This project is rated medium to low hazard because of the nature of the contaminants, the site locations, and fieldwork requiring drilling. Table 3-1 summarizes the project tasks, hazards, and controls. The remainder of this section will describe potential hazards and controls in greater detail.

3.2 PHYSICAL CONSTRUCTION/PHYSICAL HAZARDS

Potential safety hazards both specific to this site and general to most site work are shown in Table 3-2. Refer to Appendix D for more detailed information concerning safety hazards and controls.

3.3 CHEMICAL HAZARDS AND CONTROL

The suspected contaminants onsite are listed in Table 3-3. The physical, chemical, and health effects of hazardous chemical substances are itemized in Table 3-4. Generic chemical hazard profiles of these substances by groups (e.g., calibration gases, metals, corrosives, petroleum-based hydrocarbons, and solvents and paints) are provided as Appendix C to this HSP. Refer also to Jacobs SOPs 7.0 through 7.9.

Generic chemical hazard profiles are provided in Appendix C for those chemicals that are typically used for sampling equipment decontamination. These chemicals are also listed in Table 3-5. More detailed Material Safety Data Sheet (MSDS) information specific to each chemical is provided in Appendix G.

Note: Anyone bringing chemicals to this site is required to provide an MSDS to the PHSM.

TABLE 3-1

Project Hazard Analysis

Task/Activity	Potential Hazards	Controls/Jacobs SOPs
Site Mobilization Heavy equipment operation	<ul style="list-style-type: none"> equipment accidents, personal injuries, fall of suspended load vehicle accidents dust generation crushing injuries 	<ul style="list-style-type: none"> operator certification: training must comply with EM385.1.1/18A enforce vehicle safety procedures, restrict access, monitor dust suppression procedure enforce/train in code of safe practices
Soil Sampling Hand Augering	<ul style="list-style-type: none"> noise belowground utilities traffic dust exposure, fuels, waste oil flying objects 	<ul style="list-style-type: none"> see Table 3-2 utility clearance provide flag person or other control as required by EM385.1.1/8B; see Table 3-2 air monitoring, PPE, work practice controls, dust control wear hard hat and safety glasses when PHSM determines hazards to the head or eyes exist
Subsurface Soil Sampling	<ul style="list-style-type: none"> belowground utilities noise manual material handling heat stress electrical slips, trips, and falls 	<ul style="list-style-type: none"> follow utility clearance procedure, Jacobs SOP 7.7 see Table 3-2 comply with Jacobs CS/SOP 10.15 - Materials Handling and Storage follow guidelines in Section 3.5 ground fault circuit interrupters on all circuits; grounding on all; follow guidance in Table 3-2. follow guidance in Appendix D
Surface Water and Sediment Sampling	<ul style="list-style-type: none"> heat stress slips, trips, and falls 	<ul style="list-style-type: none"> follow guidelines in Section 3.5 follow guidance in Appendix D

TABLE 3-1

Project Hazard Analysis

Task/Activity	Potential Hazards	Controls/Jacobs SOPs
<i>Groundwater Monitoring Well Installation</i>	<ul style="list-style-type: none"> belowground utilities noise manual material handling heat stress electrical slips, trips, and falls heavy equipment aboveground utilities repetitive strain - upper extremity chemical exposure: TCE, possibly radium 	<ul style="list-style-type: none"> follow utility clearance procedure, Jacobs SOP 7.7 see Table 3-2 comply with Jacobs CS/SOP 10.15 - Materials Handling and Storage follow guidelines in Section 3.5 ground fault circuit interrupters on all circuits; grounding on all; follow guidance in Table 3-2. follow guidance in Appendix D ensure operator certification and training; comply with EM385.1.1/184 see Table 3-2 see Table 3-2 air monitoring, PPE, work practice controls
<i>Groundwater Sampling</i>	<ul style="list-style-type: none"> slips, trips, and falls manual material handling repetitive strain upper extremity electrical heat stress chemical exposure: TCE, possible radium 	<ul style="list-style-type: none"> follow guidance in Appendix D comply with Jacobs CS/SOP 10.15, Materials Handling and Storage see Table 3-2 follow guidance in Table 3-2 follow guidelines in Section 3.5 air monitoring, PPE, work practice controls
<i>Equipment Decontamination</i>	<ul style="list-style-type: none"> fuels, waste oils manual materials handling high-pressure steam cleaning solvents for equipment decontamination 	<ul style="list-style-type: none"> air monitoring, PPE, dust control comply with Jacobs CS/SOP 10.15, Materials Handling and Storage see Table 3-2 air monitoring

Notes:

CS = Corporate Safety

EH&S = Jacobs Environmental Health and Safety Manual

PHSM = Program Health and Safety Manager

PPE = personal protective equipment

SOP = standard operating procedure

UV = ultraviolet

TABLE 3-2

Physical Hazards and Controls

Hazard	Engineering or Administrative Controls
Flying debris/objects	Provide shielding and PPE. An emergency eye wash and shower must be available at work location.
Steep terrain/unstable surface	Brace and shore equipment.
Static electricity	Make certain there are no spark sources within 50 feet of an excavation or heavy equipment. Bonding and grounding are required when filling or removing flammable liquids from containers such as tanks or drums.
Gas cylinders	Make certain that gas cylinders are properly anchored, chained, and capped. Keep cylinders away from ignition sources and protected from direct sunlight.
High-pressure hose hazards	Check that fittings and pressurized lines are in good repair before using. Secure all lines to prevent whipping. Direct spray only at surfaces to be cleaned. Wear face shield and safety glasses to protect from spray and flying objects.
Electrical shock	Make certain that equipment is properly grounded. Do not modify electrical wiring unless qualified to do so. Follow lock-out/tag-out procedures discussed in Appendix D.
Underground utilities	Follow Jacobs SOP 7.7 (EH&S Manual), which requires hand augering to 7 feet and overreaming all drill holes, and probing all areas to be excavated with a nonconductive pole. Complete the Clearance Form found in SOP 7.7.
Overhead electrical wires	Heavy equipment must remain at least 15 feet from overhead powerlines of 50 kV or less. For each kV over 50, increase distance 0.5 foot.
Muddy, wet, or slippery work areas	Use wood pallets or similar devices in muddy work areas. Avoid these areas whenever possible.
Back injury	Use proper lifting techniques. Use mechanical lifting aids whenever possible.
Protruding objects	Flag and/or pad visible objects. Flatten or remove all protruding spikes, nails, and other sharp objects that may cause injury.
Suspended loads	Do not work under suspended loads. Barricade accessible areas under the swing radius of the load.
Repetitive strain - upper extremities	Take frequent rest breaks, rest and stretch the affected area (wrist, elbow, etc.). Eliminate or reduce activities that force the wrist or other body part into an unnatural position, requires sustained repetitive motion, or puts excessive strain on the wrist or other body part.
Heavy equipment	A backup alarm is required for heavy equipment. Observer must remain in contact with operator, and will signal when backup is safe. All personnel must remain outside the equipment's turning radius. Make equipment operators aware of your presence: inform operators at the beginning of the day if you must work in their vicinity.

TABLE 3-2

Physical Hazards and Controls

Hazard	Engineering or Administrative Controls
Fire protection	Keep fire extinguishers in the clear but near operations. Do not tamper with extinguishers. Maintain all firefighting equipment in operating condition. In case of fire, immediately activate the fire alarm, and then use the correct type of extinguisher. Use equipment correctly; do not delay.
Flammable and combustible liquids	Use only approved National Fire Protection Association (NFPA) or Underwriter's Laboratories (UL) containers, cabinets, and portable tanks for storage and dispensing. Keep flammable liquids in closed containers when they are not in use. Label all containers as to contents and directions for safe use. Refer to the MSDSs attached to this HSP for specific information on any chemicals brought to this site. Bonding and grounding are required during container filling and emptying.
Traffic	Place warning signs. Employees exposed to the hazards of vehicular traffic are required to wear orange warning garments. During dusk, dawn, or dark times, employees must wear warning garments made of reflective material. See also Appendix D.
Inclement weather	Stop work during inclement weather. Notify SHSC or PHSM.
Working alone	Do not work alone. The buddy system will be enforced.
Sunburn	Wear long-sleeved shirts or use sunscreen (SPF 20 UVA & UVB) and provide a shady area.
Heat stress	Use wet bulb globe temperature (WBGT) monitoring guidelines. Check employee's pulse and temperature. See Section 3.5.
Falls	All work above 6 feet in elevation requires fall protection. Refer to Jacobs Corporate Safety Manual, SOP 7.8: Fall Protection Policy for additional information.
Noise	If noise levels are greater than 85 dBA or voices must be raised to be heard in normal conversation at 3 feet apart, hearing protection adequate to reduce exposures to below 85 dBA must be worn. Refer to Appendix D.

Notes:

dBA = decibels (on the A-weighted scale)
 HSP = Health and Safety Plan
 kV = kilovolt
 MSDS = Material Safety Data Sheet
 OSHA = Occupational Safety and Health Administration
 PHSM = Project Health and Safety Manager
 PPE = personal protective equipment
 SHSC = Site Health and Safety Coordinator
 SOP = standard operating procedure
 SPF = sun protection factor
 UVA = ultraviolet A
 UVB = ultraviolet B
 > = greater than

TABLE 3-3

**Suspected Contaminants for Basewide Background Study and
Weapon Storage Area Background Study**

Suspected Contaminants
Trichloroethylene
Radium 226

(Former base hospital to be added after PA is complete.)

TABLE 3-4

Hazardous Chemical Substances of Occupational Health Concern at NAS Fort Worth

CHEMICAL NAME	PEL/ TLV ¹	OTHER LIMITS ¹	CHEMICAL GROUP ²	WARNING PROPERTIES	PHYSICAL PROPERTIES	TARGET ORGANS	ACUTE/CHRONIC HEALTH EFFECTS	CANCER
Trichloroethylene (TCE)	100/50 ppm	Ceiling: 200 ppm STEL: 100 ppm IDLH: 1,000 ppm	Solvents	Chloroform-like odor, odor threshold 82 ppm	LEL: 8%	Eyes, skin, respiratory system, heart, liver, CNS	Irritated eyes, skin, headache, vertigo, fatigue, giddiness, tremors, nausea, vomiting, cardiac arrhythmia, liver carcinogen.	Yes
Radium	N/A	3E-10 µCi/mL	Alkaline earth	µCi/mL = microcuries/milliliter	Radioactive metal. MP: 700 °C half-life: 1,600 years	Bone, lung, blood	Acute effects not apparent in levels anticipated. Chronic health effect is increased risk of cancer.	Yes

Notes:

1 The PEL/TLV and other limits columns include applicable exposure limits as prescribed in the *NIOSH Pocket Guide to Chemical Hazards*. U.S. Department of Health and Human Services. 1990 (June). Publication No. 90-117.

2 The chemical group column is generic to facilitate referencing Appendices C and G.

C = centigrade
 CNS = central nervous system
 eV = electron volt
 F = Fahrenheit
 FP = flash point
 IDLH = immediately dangerous to life or health
 IP = ionization potential
 LEL = lower explosive limit
 PEL = permissible exposure limit
 ppm = parts per million
 mg/m³ = milligrams per cubic meter
 mm = millimeter
 MP = melting point
 N/A = not applicable
 REL = recommended exposure limit
 STEL = short-term exposure limit
 TLV = threshold limit value
 VP = vapor pressure
 ° = degrees
 % = percent
 µCi/mL = microcuries per milliliter

TABLE 3-5

Generic Chemicals That May Be Brought Onsite

Chemical	Generic Chemical Hazard Group
Methanol (methyl alcohol)	Solvents (nonhalogenated)
Hexane	Solvents (nonhalogenated)
Calibration Gases	Various

3.4 BIOLOGICAL HAZARDS AND CONTROLS

There is potential for bites from insects, snakes, and rodents, as well as possible contact with poisonous plants. More detailed information concerning biological hazards and controls are provided in Appendix D.

3.5 HEAT AND COLD STRESS

The Jacobs EH&S Manual, SOPs 7.1 and 7.2 (Jacobs undated a), outlines exposure control methods for working in extreme temperatures. The PHSM will implement SOPs 7.1 and 7.2, including environmental and physiological monitoring requirements. Table 3-6 summarizes symptoms and treatment procedures for heat and cold stress.

3.6 RADIOLOGICAL HAZARDS

The presence of radiological hazards is not generally expected. However, there is a potential for encountering subsurface radium contamination during well installation around the radioactive material burial area. If direct radiation screening of well cuttings indicates the presence of radium contamination at greater than two times above natural background levels, the PHSM will consult with the Jacobs Corporate Health Physicist about necessary exposure control methods.

3.7 CONFINED SPACE HAZARD

Confined space entries are not expected under the current scope of work. If entry is necessary, then the PHSM must ensure compliance with Jacobs' CS/SOP 8.6: Confined Space Entry (Jacobs undated b).

TABLE 3-6

Symptoms and Treatment of Heat and Cold Stress

Condition	Symptoms	Treatment
Heat stroke	Red, hot dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; high body temperature.	This is a MEDICAL EMERGENCY! Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. Get medical attention immediately!
Heat exhaustion	Pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; vomiting.	Move victim to a cool, air-conditioned area. Loosen clothing, place head in low position. Have victim drink cool (not cold) water.
Frostbite	Blanched, white, waxy skin, but resilient tissue; tissue cold and pale.	Move victim to a warm area. Warm area quickly in warm (not hot) water. Have victim drink warm fluids - not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention.
Hypothermia	Shivering, apathy, sleepiness, rapid drop in body temperature; glassy stare; slow pulse; slow respiration.	Move victim to a warm area. Have victim drink warm fluids - not coffee or alcohol. Get medical attention.

4.0 SITE CONTROL

The following sections describe site control procedures and practices.

4.1 SITE CONTROL PROCEDURES

The SHSC has the following site control responsibilities:

- Limit access to the sampling location(s) and post appropriate warning signs or caution tape.
- Ensure “buddy system” requirements of 29 CFR 1910.120 are followed.
- Keep a copy of this HSP readily available.
- Establish onsite communications. These should consist of the following:
 - line of sight;
 - agreed-upon hand signals or two-way radio; and
 - air horn.
- Establish offsite communications using two-way radio and/or telephone.
- Set a wind indicator to readily determine wind direction.
- Establish and delineate contiguous work zones (exclusion, contamination reduction, and support) per Jacobs EH&S Manual/SOP 7.3: Work Zones. The latter two zones should be upwind of the exclusion zone unless obstacles make it infeasible.
- Establish decontamination and waste disposal procedures.

4.2 WORK PRACTICES

All personnel will be responsible for compliance with the following work practices:

- Suspend field operations if any unforeseen hazards become apparent in the field that require greater precautions other than those specified in the HSP. (These are responsibilities for the PHSM.)
- Meet the “buddy system” (working in teams of two people) requirements of 29 CFR 1910.120(d)(3) at all times.
- Maintain a copy of the site tailgate and exclusion zone entry log (Appendix E).
- Implement dust- or vapor-suppression methods to minimize unwanted emissions.

- Position all personnel upwind of sampling locations.
- Avoid visibly contaminated areas as much as possible; place barriers or plastic to mark location.
- Prohibit eating, drinking, or smoking in exclusion zones or contamination reduction zones where access is restricted.
- Establish areas for eating, drinking, and smoking. Drinking water, juices, and cups are to be supplied in the support area.
- Store chemicals brought onsite in properly labeled containers and where they are unlikely to be accidentally disturbed.
- Perform work during daylight hours. (Night work requires modification to this HSP.)
- If toilet facilities are not located within a three-minute walk from the decontamination area, either provide a chemical toilet and hand-washing facility, or have a vehicle available (not the emergency vehicle) for transport to nearby facilities.

A copy of the HSP must be available in the control zone or the vehicle designated for emergencies.

4.3 DECONTAMINATION PROCEDURES

The following sections describe decontamination procedures for equipment and personnel.

4.3.1 Samples and Equipment

The PHSM shall verify that pieces of equipment going offsite are properly decontaminated according to the procedures outlined below. Decontamination must be documented in the field logbook that is a part of the permanent project file.

- Sampling Equipment. Follow detailed procedures in Appendix H.
- Samples. Wipe exterior of sample containers to remove visible contamination.
- Heavy Equipment. Scrape off dirt. Steam clean at the decontamination pad before moving to another site.

- Vehicles. Vehicles driven within the boundaries of the sites must be washed and the interior vacuumed before returning the vehicle to the office, rental agency, or to any person not named in this HSP. A commercial car wash is adequate for this purpose. Vehicles driven in the exclusion zone, extended into a part of the exclusion zone, or used to transport contaminated personnel or supplies must be steam cleaned inside and outside at the decontamination pad before going to another site. Vehicles do not have to be decontaminated between boreholes.

4.3.2 Personnel

Personnel decontamination procedures will depend on the level of PPE worn in the field.

Level D and D+ Personal Protective Equipment. Wash and rinse gloves and boots with soap and water. Remove and dispose of gloves and coveralls. Wash hands and face with soap and water. Figure 4-1 outlines a typical Level D and D+ decontamination layout.

Levels B and C Personal Protective Equipment. A decontamination schematic is provided in Figure 4-2; procedural details are described in Table 4-1.

4.4 SPILL CONTAINMENT PROCEDURES

Refer to the most current edition of the U.S. Department of Transportation (DOT) Emergency Response Guide Book (DOT P 5800.5), to Jacobs' SOP 7.10 (Spill Containment) in the EH&S Manual (Jacobs undated a), and to the Work Plan for this project.

The following are potential spills sources during field operations: hydraulic oil from vehicles, contaminated soils from excavation, and decontamination liquids. Containerizing materials as soon as possible will reduce the potential for spills. Handling of waste materials and containers will be in accordance with the Work Plan developed for NAS Fort Worth.

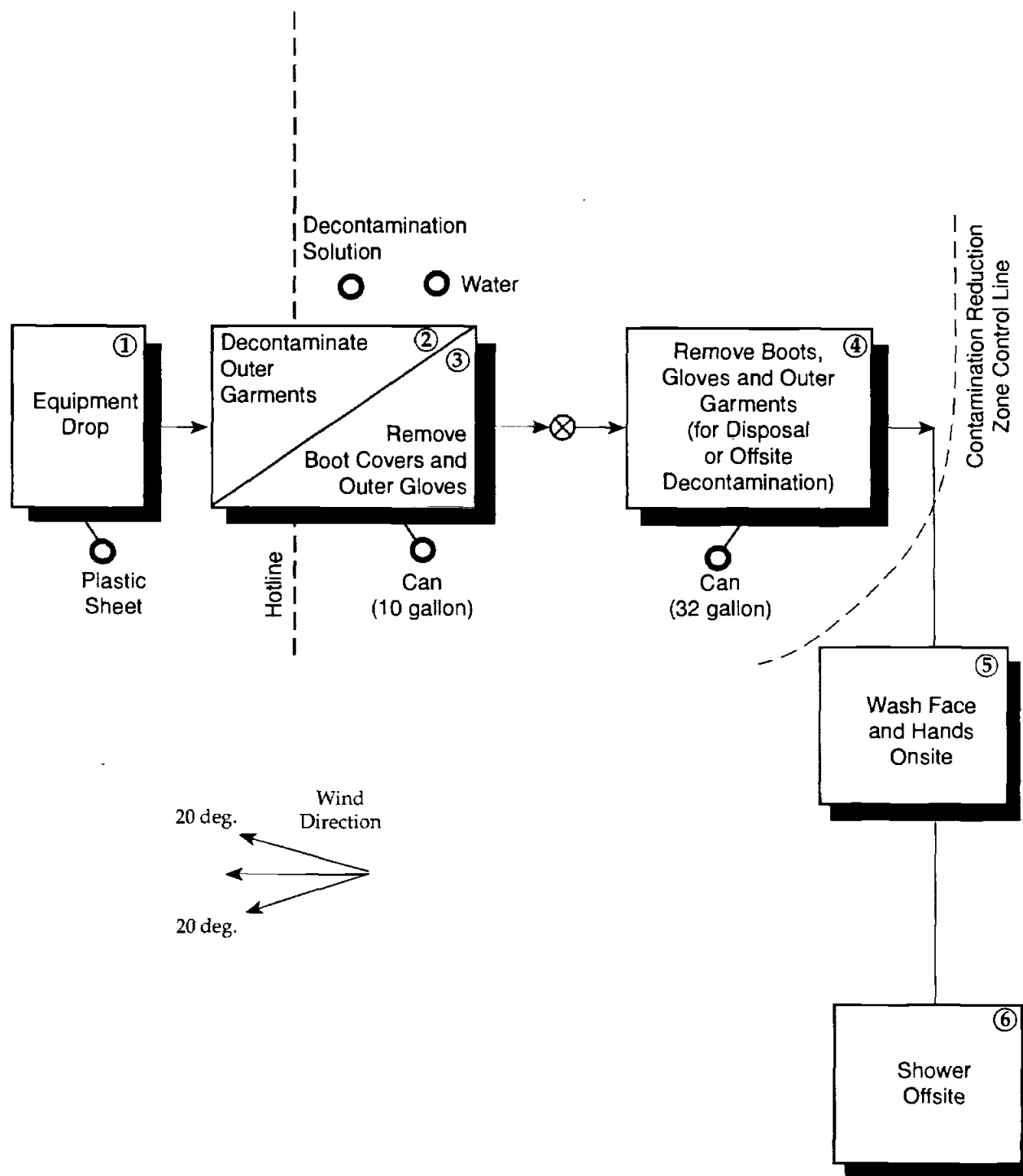


FIGURE 4-1
Typical Level D and D+
Decontamination Minimum Layout
NAS Fort Worth
Fort Worth, Texas

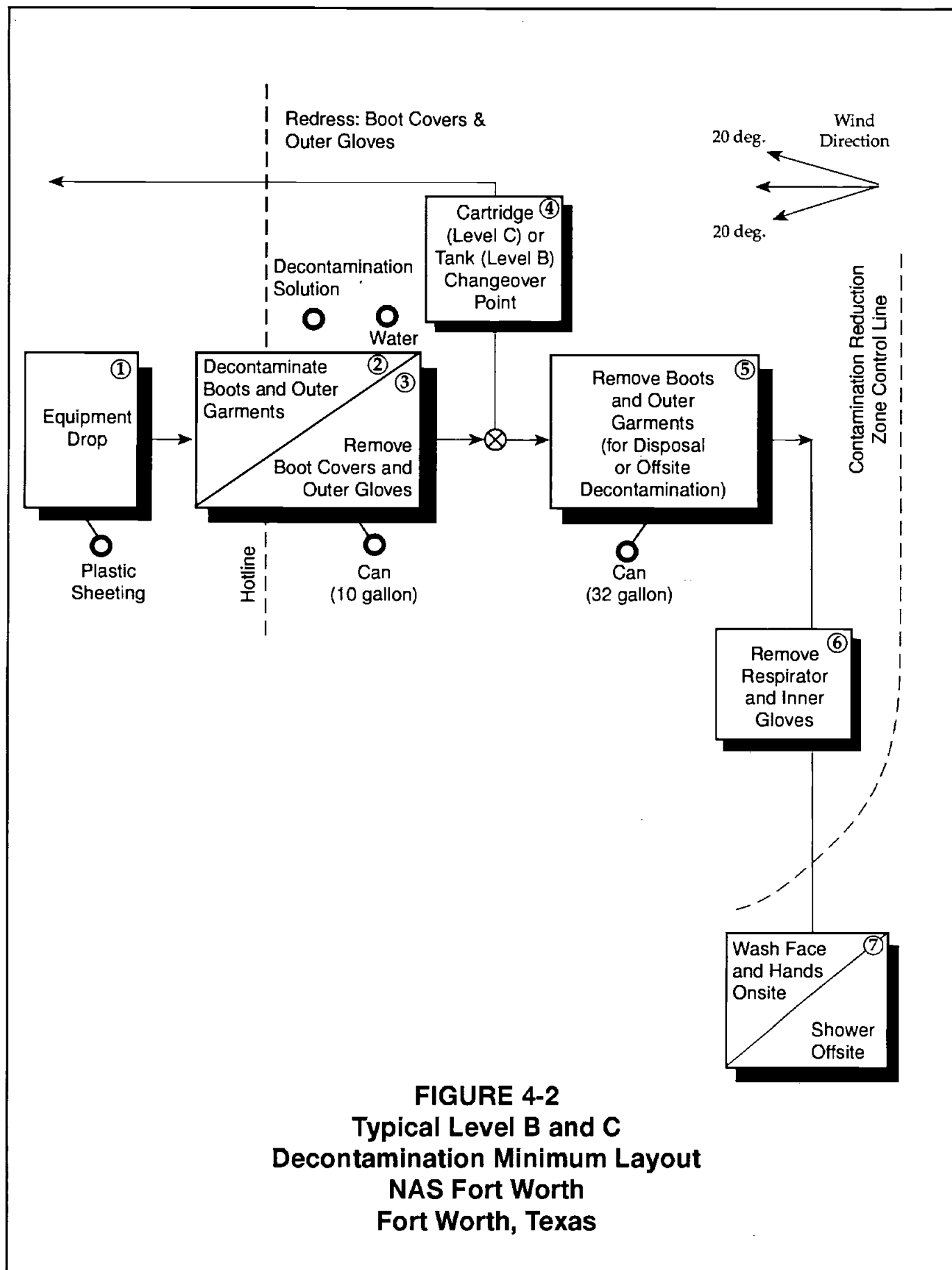


FIGURE 4-2
Typical Level B and C
Decontamination Minimum Layout
NAS Fort Worth
Fort Worth, Texas

TABLE 4-1

Decontamination Procedures

Station	Procedure	Equipment and Supplies
1. Equipment drop	Deposit equipment used onsite (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.	a) various size containers b) plastic liners and drop cloths
2. Wash outer garments and boots	Scrub outer boots, outer gloves, and splash suit with an aqueous solution of Alconox® or other nonphosphate detergent. Rinse with copious amounts of water. Remove tape.	a) containers (20- to 30-gallon) b) decontamination solution (Alconox® or other non-phosphate detergent) c) rinse water d) two to three long-handled, soft-bristled brushes
3. Remove outer boots and gloves	Remove outer boots and gloves. Deposit them in a plastic-lined container.	a) containers (20- to 30-gallon) b) plastic liners c) benches or stools and tables
4. Change air tank (Level B) or respirator cartridge (Level C)	If a worker leaves the exclusion zone to change the air tank or respirator cartridge, this is the last step in the decontamination procedure. Exchange air tank or respirator cartridge, don new outer gloves and boot covers, tape joints, and return to duty.	a) air tanks or respirator and cartridges, depending on level of protection b) tape c) boot covers d) gloves
5. Remove boots and outer garments	Remove boots, chemical-resistant splash suit, and outer garments and deposit in separate plastic-lined containers.	a) containers (20- to 30-gallon) b) plastic liners c) benches or stools and tables

TABLE 4-1

Decontamination Procedures

Station	Procedure	Equipment and Supplies
6. Respirator and inner glove removal	Remove respirator without touching face with inner gloves. Deposit respirator on plastic sheets and inner glove into lined container.	<ul style="list-style-type: none"> a) plastic sheets b) basin or bucket c) soap, water, and towels d) benches or stools and tables
7. Personnel wash	Wash hands and face thoroughly. Shower as soon as possible.	<ul style="list-style-type: none"> a) soap and water b) tables c) wash basin or bucket

If spills occur, the PHSM is to be notified immediately. The PHSM will be responsible for ensuring necessary notifications are given to the PHSD and the AFCEE representative. The AFCEE representative will inform the station emergency responders if necessary. The AFCEE representative and Jacobs will determine the strategy for notifying regulatory agencies.

The following materials and equipment will be available for spill containment:

- additional drums;
- drum-patching kit;
- absorbent materials (granular, rolls, sheets, booms etc.);
- shovels and towels; and
- plastic sheeting.

4.5 DISPOSAL OF WASTE MATERIALS GENERATED ONSITE

Any site-derived materials such as decontamination fluids and soil samples shall be contained in separate 55-gallon drums, roll-off containers, or wastewater holding tanks. All PPE shall be contained in plastic bags and labeled with the site location. All containers will be inventoried and moved to the temporary staging area designated by the base point of contact (POC). Containers and/or roll-off bins may not be transported offsite for disposal until analytical results of samples collected at the boreholes have been received and the container contents have been classified.

Hazardous waste containers shall be transported by a registered hauler to a permitted treatment, storage, and disposal facility (TSDF). NAS Fort Worth representatives must sign hazardous waste manifests. Solid trash and PPE that has been contaminated shall also be disposed of as hazardous waste.

Solid trash, i.e., disposable PPE and items used in the work zones that are not contaminated at concentrations sufficient to be classified as hazardous waste, shall be

contained and disposed of as industrial solid waste with other trash generated at NAS Fort Worth.

Soils that are *not* classified as hazardous waste will be disposed of as designated by NAS Fort Worth.

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5.0 AIR MONITORING

Air monitoring will be conducted to prevent exposure to dust or hazardous chemicals, as described below.

5.1 ENVIRONMENTAL MONITORING

Air monitoring is required for work activities that disturb soil, prior to groundwater monitoring, and during decontamination using hexane or methanol. Air monitoring during these activities shall be performed with a screening or direct-reading photoionization detector (PID). Direct radiation screening is required for cuttings produced during well installation within 100 feet of the radioactive material burial area. Calibration specifications for instruments are shown in Table 5-1. The monitoring frequency and action levels are shown in Table 5-2. Appendix I contains forms for recording air monitoring results and calibration data. Radiation screening results will be recorded in field notebooks.

5.2 PERSONAL EXPOSURE MONITORING

If elevated levels of specific substances are detected using the instruments listed in Table 5-2, the PHSM shall be notified so that an evaluation can be made to determine whether personal monitoring will be performed.

If personal monitoring is performed, it shall be in accordance with the NIOSH standardized sampling and analytical methods or other equivalent methods. These methods specify quality assurance procedures for calibration, sample media, collection parameters, sampling, and analysis of samples. Samples shall be analyzed by a laboratory accredited by the American Industrial Hygiene Association (AIHA).

Personal air monitoring shall be documented and maintained in an employee's personnel file and in the site project files. Employees monitored shall receive a copy of the sampling results. The air monitoring record form is included in Appendix I.

TABLE 5-1

Calibration Specification

Instrument	Gas	Span	Reading	Method
Victoreen Model 19 rate meter with Model 489-110c GM pancake probe (or equivalent)	NA	NA	+ 20% of check source certification	Vendor calibration ** and field performance check
PID: HNu P1 101 (10.2 eV probe)	100 ppm isobutylene	8.2 *	89 ppm	1.5 L/min reg. T-tubing or 0.25 L/min reg. direct tubing

Notes:

* To direct read for trichloroethylene

** Calibration certificate specified

Manufacturer's instruction or operating manual shall be available at the site.

eV = electron volt
 GM = Geiger-Mueller
 L/min = liters per minute
 N/A = not applicable
 PID = photoionization detector
 ppm = parts per million
 reg. = regulator
 ± = plus or minus
 % = percent

TABLE 5-2

Equipment Specification and Action Levels

Instrument	Tasks	Action Levels	Frequency ¹	Calibration ²
Victoreen Model 19 rate meter with Model 489-110c GM pancake probe (or equivalent)	Well installation	>2 x background stop work, reevaluate with health physicist	Surface prior to intrusive activity. Cuttings generated - a minimum of every 30 minutes during drilling.	Daily performance check
PID HNu (10.2 eV or equivalent)	Well installation Soil sampling Equipment decontamination Groundwater sampling	0-5.0 ppm ab >5 ppm ab >100 ppm ab	In the breathing zone at the beginning of operations and a minimum of every 30 minutes. Levels C and B require continuous monitoring.	Daily - pre and post use
Heat stress monitor and physiological monitor	When PPE is worn or temperatures are elevated	Reference Jacobs EH&S Manual SOP 7.1.	Per Section 3.5 and Appendix F	Not applicable
Noise level monitor	All tasks	Noise measurements are required when voice must be raised to communicate at a distance of 3 feet or less	Initial measurement and at 30 minute intervals while readings are above 85 dBA	Daily - pre and post use

1. Air monitoring shall be documented using Exposure Form in Appendix I.
2. Calibrations shall be documented using calibration log in Appendix I.

References:

ab = above background
dBA = decibels on the A-weighted scale
EH&S = Environmental Health and Safety
eV = electron volt
GM = Geiger-Mueller
LEL = lower explosive limit
PID = photoionization detector
ppm = parts per million

American Conference of Government Industrial Hygienists. 1994.
US Department of Health and Human Services. 1985, 1990.
29 Code of Federal Regulations Part 1910.

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6.0 PERSONAL PROTECTIVE EQUIPMENT

PPE ensembles for waste site activities are defined by EPA and OSHA. Level D consists of a basic work uniform and common construction-related PPE that includes a hard hat, steel-toed safety boots, and safety glasses with side shields. Other PPE, such as leather or cotton gloves, are added as necessary. Level D+ adds a limited amount of chemical protection for the skin. Over the work uniform, chemical-resistant overshoes or boots, a Tyvek suit, and chemical-resistant gloves are added.

Level C adds an air-purifying respirator and specialized whole-body clothing such as a coated Tyvek suit and two pairs of chemical-resistant gloves. The ankles, wrists, and seams may be taped. Level B replaces the air purifying respirator with one that provides a supplied air source: either an airline/Cascade System or a self-contained breathing apparatus (SCBA). Level A includes a totally encapsulating chemical-resistant whole-body suit. SCBA is generally worn for Level A. Table 6-1 summarizes the PPE ensembles that are required for this project by work task.

The following EH&S Manual SOPs provide specific information on the Jacobs PPE program (Jacobs undated a):

- SOP 4.0 PPE Levels of Protection Selection Criteria;
- SOP 4.1 PPE Donning/Doffing Level A Ensemble;
- SOP 4.2 PPE Donning/Doffing Level B Ensemble;
- SOP 4.3 PPE Donning/Doffing Level C Ensemble;
- SOP 4.4 Respiratory Protection Program Inspection and Maintenance of Air Purifying Respirator;
- SOP 4.5 Respiratory Protection Program SCBA Checkout Procedures; and
- SOP 4.6 Respiratory Protection Program Respirator Fit Test.

TABLE 6-1

Personal Protective Equipment Specifications

Task	Level	Body ¹	Foot (ANSI Z 41.1)	Head (ANSI Z 89.1) (ANSI Z 87)	Eye (ANSI Z 87)	Hand	Respirator (ANSI Z 88.2)	Hearing Protection
Minimum for field work outside EZ and CRZ	D	• None required	• Steel toe/shank leather safety shoes/boots	• Hard hat	• Safety glasses	• Work gloves may be used	• None required	• Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 3 feet apart in normal conversation, voices must be raised to be heard
All, when solids or liquid samples are handled, handling contaminated soils.	D+	• Disposable Tyvek coveralls OR disposable polyethylene (PE) coated Tyvek coveralls	• Steel toe/shank leather safety boots with Tyvek, neoprene, or nitrile boot covers OR neoprene or nitrile boots with steel toe/shank	• Hard Hat	• Safety glasses or goggles	• Inner Gloves: N-Dex, Nitrile, OR Latex Rubber • Outer Gloves: Nitrile;	• None required	• Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 3 feet apart in normal conversation, voices must be raised to be heard
All, as determined by air monitoring results	C	• Same as Level D+	• Steel toe/shank leather safety boots with Tyvek, neoprene, or nitrile boot covers OR neoprene or nitrile boots with steel toe/shank	• Hard Hat		• Inner Gloves: N-Dex, Nitrile, OR Latex Rubber • Outer Gloves: Nitrile;	• Full face air purifying respirator, North 7600-8A or equivalent equipped with cartridges for protection against organic vapors, acid gases, dusts, fumes and mists	• Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 3 feet apart in normal conversation, voices must be raised to be heard
All, as determined by air monitoring results	B	• Limited use chemical, barricade, or responder suits as determined by PHSD	• Neoprene OR nitrile boots with steel shank	• Hard Hat		• Inner Gloves: N-Dex, Nitrile, OR Latex Rubber • Outer Gloves: Nitrile	• Full face pressure demand airline or self-contained breathing apparatus with Grade D or better breathing air for either respiratory system used.	• Within 20 feet of noise source that exceeds 85 dBA • Usually when, at 3 feet apart in normal conversation, voices must be raised to be heard

Notes:

¹ if significant body contact is anticipated

ANSI = American National Standards Institute
dBA = decibels on the A-weighted scale
CRZ = contamination reduction zone

EZ = exclusion zone
PE = polyethylene
PHSD = Project Health and Safety Director
PHSM = Program Health and Safety Manager

PPE levels may be upgraded or downgraded based on the results of direct-reading air monitoring equipment. Table 6-2 summarizes conditions that require an upgrade or that may indicate that a downgrade is possible.

PPE will be inspected and tested as required in Jacobs SOPs. Respirators will be inspected after each use, or monthly, whichever is more frequent.

TABLE 6-2
Reasons to Upgrade or Downgrade Level of Protection

Upgrade	Downgrade
<ul style="list-style-type: none"> • Request of individual performing task, with concurrence from Project Health and Safety Manager. • Change in work task will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Personnel air monitoring results exceed 100 x PEL while full face respirator is worn. • Action levels described in Table 5-2 exceeded. 	<ul style="list-style-type: none"> • New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task will reduce contact with hazardous materials.

Note:

PEL = permissible exposure limit

7.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

The following sections describe emergency response activities.

7.1 EMERGENCY PLANNING

The PHSM performs the applicable emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate. The PHSM is responsible for the following:

- evaluates and documents capabilities of local NAS Fort Worth emergency response teams, if any;
- verifies local emergency contacts, hospital routes, evacuation routes, and assembly points;
- notifies appropriate emergency responders listed in Section 7.6 before site mobilization;
- confirms and post(s) emergency telephone numbers and route to hospital;
- posts site map marked with location of emergency equipment and supplies;
- drives and verifies route to hospital; ensures employees drive route to hospital;
- designates one vehicle as the emergency vehicle; places a copy of this HSP, including the hospital directions and map, inside; keeps keys in ignition during field activities;
- inventories and checks site emergency equipment and supplies;
- establishes emergency signals, evacuation routes, and onsite and offsite assembly points;
- reviews emergency procedures for personnel injury (Section 7.3);
- reviews names of onsite personnel trained in first aid and CPR;
- reviews emergency response and post-emergency notification procedures;
- rehearses the emergency response plan once, before site activities;
- points out to field team members where emergency response equipment is located in the support area;

- briefs new workers on the emergency response plan; and
- refers also to Figure 7-1, which shows a typical emergency response operations flow diagram.

7.2 EMERGENCY EQUIPMENT AND SUPPLIES

The following emergency equipment and supplies will be kept onsite:

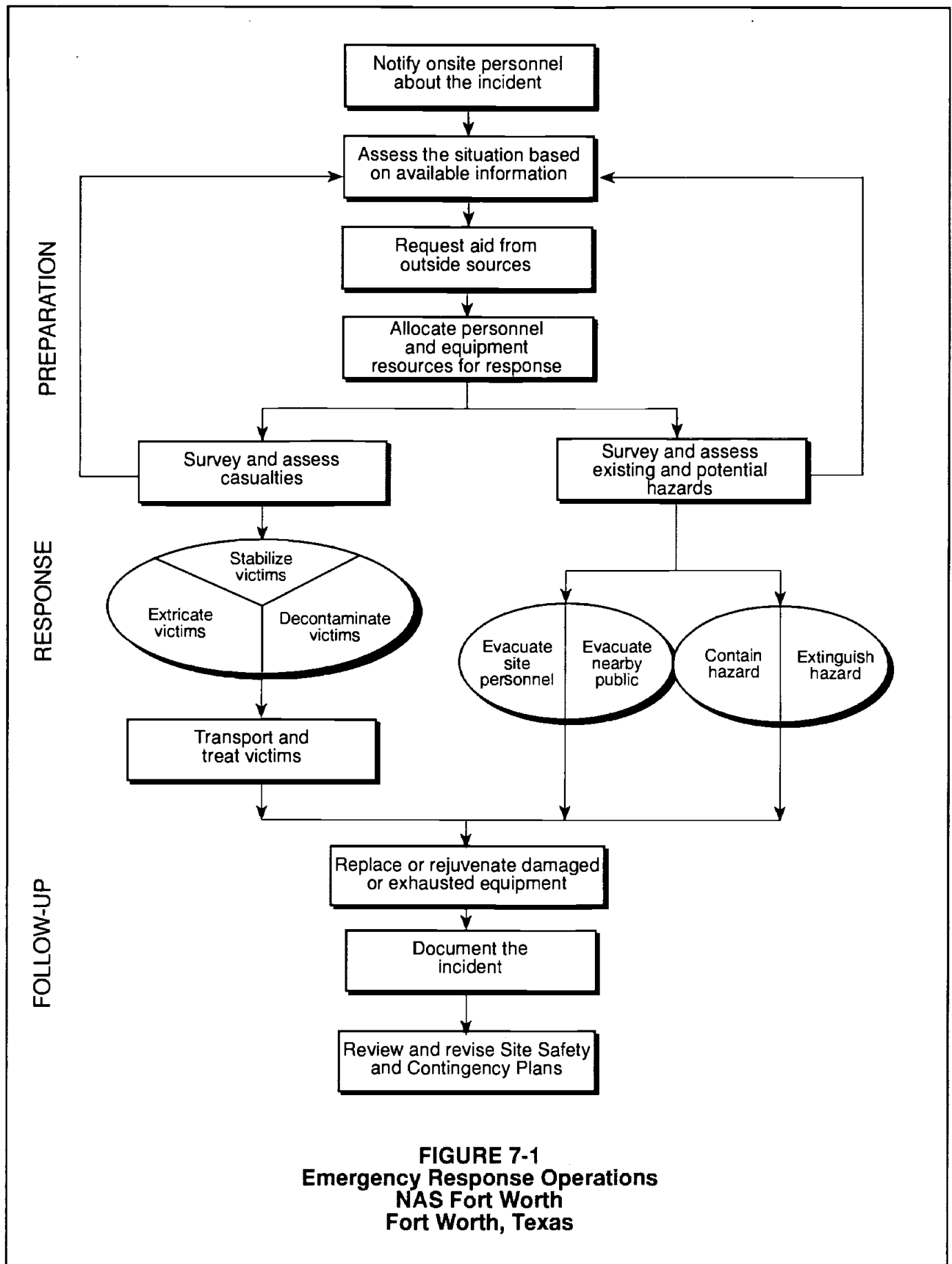
- 20-pound A:B:C fire extinguisher (or equivalent);
- industrial first aid kit (10-unit minimum);
- one-way breathing shield for CPR;
- rubber gloves (latex or other);
- stretcher or blanket;
- water and electrolyte replenishers (Gatorade[®], etc.);
- two-way radio(s) or cellular phone;
- air horn;
- wind direction indicator;
- portable pressurized eyewash/shower (where contact with corrosive materials is possible);
- sorbent material or spill containment supplies; and
- red bag labeled with biohazard symbol for disposal of potentially infectious materials.

7.3 EMERGENCY PROCEDURES

The following procedures will be followed during a site emergency.

7.3.1 Emergency Medical Treatment

If a medical emergency occurs, the PHSM shall assume charge until ambulance arrives, or until injured person is admitted to the emergency room.



Site personnel will prevent further injury by completing the actions listed below:

- Initiate first aid and CPR if certified. Refer to Section 7.4 for information on the bloodborne pathogen provision.
- Call ambulance and hospital as appropriate. Arrange with NAS Fort Worth for entry procedures.
- Determine whether decontamination will make injury worse. If yes, seek medical treatment immediately.
- Make certain the injured person is accompanied to the emergency room by at least one field team member with the same employer.

Hospital emergency personnel will be provided with a copy of the HSP. An Authorization for Medical Treatment Form (Appendix J) shall be taken with the injured employee to the medical facility. The top portion of the form is completed by the PHSM, and the bottom portion is completed by the doctor at the medical facility. The completed form shall be forwarded as listed in Section 7.7.

7.3.2 Fire

Upon notification of a fire onsite, all site personnel will assemble at the decontamination line. The fire department will be alerted, and all personnel will move to a safe distance from the involved area.

7.3.3 Personal Protective Equipment Failure

If any site worker experiences a failure or alteration of PPE, that person and his/her buddy will immediately leave the exclusion zone through the decontamination line. Reentry will not be permitted until the equipment has been repaired or replaced.

7.3.4 Other Equipment Failure

If any other equipment onsite fails to operate properly, the PHSM will be notified and will determine the effect of this failure on continuing operations onsite. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all

personnel will leave the exclusion zone until the situation is evaluated and appropriate actions are taken.

7.3.5 Spills

Section 4.4 discusses measures to be taken if a spill occurs.

7.4 BLOODBORNE PATHOGEN PROVISION

The following procedures will be followed if a potential exposure to bloodborne pathogens occurs:

- A Hepatitis B vaccination must be offered to all employees who have occupational exposure to blood or other potentially infectious materials.
- The PHSM must be notified immediately during the work shift when a first aid incident occurs.
- The PHSM shall follow the required reporting procedures to the PHSD as listed in Section 7.7.
- The report shall include the names of all first aid providers who rendered assistance, regardless of whether PPE was used, and shall describe the first aid incident, including time and date.
- The description must include a determination if, in addition to the presence of blood or other potentially infectious material, an "exposure incident" (as defined by 29 CFR 1910.1030) occurred. This determination is necessary to ensure that the proper postexposure evaluation, prophylaxis, and follow-up procedures required by Bloodborne Pathogen SOP 7.6 (EH&S Manual) are made available immediately if there has been an "exposure incident" as defined by 29 CFR 1910.1030.
- The report shall be recorded on the First Aid Register (Appendix J).
- A one-way mouth shield must be included in or with all field first aid kits for use in CPR application to prevent transmission of body fluid between victim and rescuer.

For additional information, refer to SOP 7.6 in the Jacobs EH&S Manual (Jacobs undated a).

7.5 EVACUATION

If an evacuation is necessary, the steps below shall be followed:

- Personnel are to leave the work location (upwind) and assemble at a designated assembly point (if safe) upon detecting the emergency signal for evacuation.
- If an emergency situation is of concern to local station personnel, notify the local station contact(s) of the emergency situation.
- If appropriate and safe, the PHSM and a "buddy" are to remain at or near the sampling location after the location has been evacuated to assist local responders and advise them of the nature and location of the incident.
- The PHSM or designee is to account for field team members at the assembly point.
- The PHSM is to complete an incident report (per Section 7.7) as soon as possible after occurrence.

7.5.1 Evacuation Routes and Assembly Points

Evacuation routes and assembly points will be documented by the PHSM during the employee health and safety briefing and daily tailgate meetings.

7.5.2 Hospital Location and Information

The station hospital is closed for use by site personnel. The following is hospital location and information:

- The Harris Methodist Fort Worth Hospital is the initial primary care facility in case of an accident. The hospital is located at 1300 Pennsylvania Avenue, Fort Worth, Texas 76104.
 - Hospital: (817) 882-2000
 - Emergency Room: (817) 882-2000
 - Route to Hospital: Refer to Figure 7-2.
 - Distance: Approximately 12 miles

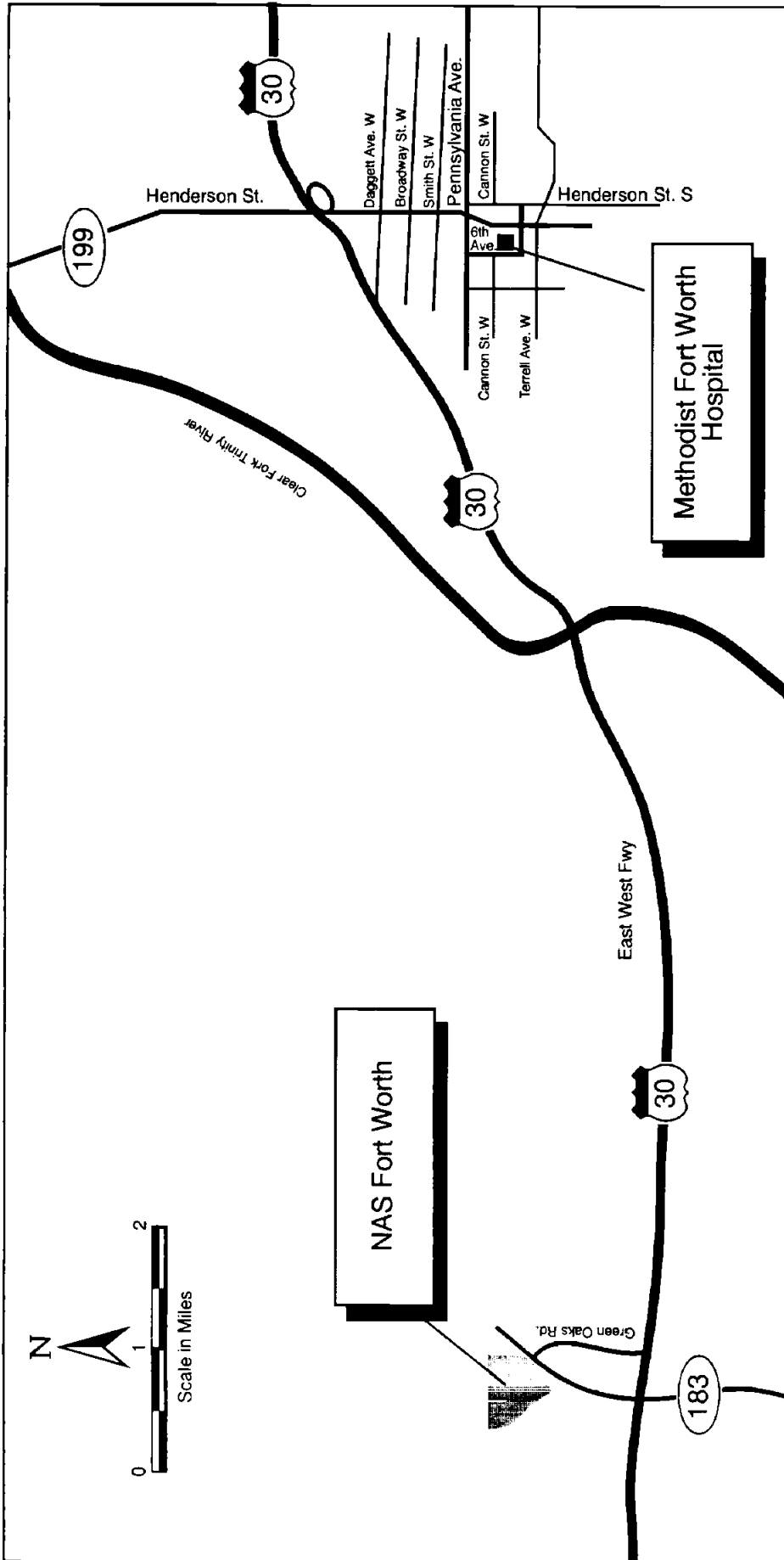


FIGURE 7-2
Emergency Route to Hospital
NAS Fort Worth
Fort Worth, Texas

- Directions: From NAS Fort Worth, take Highway 183 south to I-30 east. Exit at Henderson Street. Proceed south on Henderson Street to Pennsylvania Avenue. The hospital is on the corner of 6th Street and Pennsylvania Avenue.

7.6 EMERGENCY RESPONSE CONTACTS

Police:	911
Fire:	911
Ambulance:	911
North Texas Poison Control Center:	1 (800) 441-0040
CHEMTREC:	1 (800) 424-9300
Jacobs Emergency Medical Consultant:	Dr. Zavon(513) 421-3063

7.7 POST INCIDENT OR EMERGENCY NOTIFICATIONS AND RECORD KEEPING

As soon as possible following an accidental incident or emergency, the PHSM, or designee, is to *directly* notify the PHSD or the PjM, who will notify AFCEE, and the Health and Safety Manager of employee(s) involved. Refer to SOP 9.1 in the EH&S Manual (Jacobs undated a).

The PHSM should be prepared to provide the following information:

- PHSM's name;
- station name and project number;
- exact location of incident;
- name and employer of victim(s);
- nature and extent of injuries;
- whether victim(s) was transported offsite for medical treatment; and
- telephone number where PHSM can be contacted during next 24 hours.

Refer to Appendix J for details of all other requirements of the Jacobs SOP for Accident Investigation and Notification.

7.8 VEHICLE ACCIDENT PROCEDURE

If a vehicle accident occurs, take the following steps:

1. Stop immediately.
2. Take steps to prevent another accident (safety cones, reflectors, flares, etc.).
3. Call a doctor or ambulance if necessary:
 - Paramedics: 911; and
 - Hospital: (817) 882-2000.
4. Notify police at 911.
5. DO NOT sign any papers or make any statement as to who was at fault (except to your supervisor or a federal government investigator).
6. Notify or page PHSM within 24 hours.
7. Complete the required forms, listed below, and submit them to the PHSM as soon as possible.
 - Operator's Report of Motor Vehicle Accident with Privacy Act (required) (Appendix J);
 - Investigative Report of Motor Vehicle Accident (required). Must be signed by supervisor (Appendix J);
 - Statement of Witness (required from each witness, if any) (Appendix J);
 - invoices, including for towing charges, if any, and estimates as requested; and
 - information exchange, including information about third-party driver and government driver.
8. Submit any other forms or documents (policy reports, third-party claims, etc.) to the PHSM.
9. If damages occurred when vehicle was unattended (hit and run, etc.) or if the incident did not involve another vehicle and there are no injuries or personal property damage, the driver of the vehicle must complete all forms.

For additional information, refer to SOP 9.1 in the EH&S Manual (Jacobs undated a).

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8.0 RECORD KEEPING

OSHA and Jacobs' team record-keeping requirements will be met. Jacobs' team personnel are also required to maintain logs and daily reports (e.g., training logs, calibration logs, and daily tailgate information). The following forms are provided as attachments to this HSP and shall be maintained as documentation for demonstrating adherence to the HSP. (Refer also to Jacobs' SOP 9.1 in the EH&S Manual: Jacobs undated a.)

- Appendix A Employee Signoff;
- Appendix B Hazard Communication Forms;
- Appendix E Site Tailgate Meeting and Exclusion Zone Entry Log;
- Appendix F Visitor's Log Safety Meeting Form;
- Appendix I Health and Safety Forms, including the following:
 - Employee Physiological Monitoring Record for Heat Stress;
 - H&S Exposure Monitoring Log;
 - Field Calibration Log;
 - Air Monitoring Record Form;
- Appendix J Accident Investigation and Notification; and
- Appendix K Code of Safe Practices.

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9.0 SITE POSTINGS

The PHSM shall arrange to have all health and safety and human resources posters and information conspicuously posted in a central location at the Jacobs field office, including the following:

- Jacobs forms, including First Aid Register (Appendix J) and emergency phone numbers;
- OSHA forms and postings, including the following:
 - OSHA 200 Log (see Appendix J);
 - OSHA Safety and Health Poster;
 - Access to Medical and Exposure Records;
 - Forklift Operating Instructions; and
 - OSHA permits as applicable (excavations, scaffold erections, etc.);
- Human Resources forms and postings, including the following:
 - Notice of Workers' Compensation Insurance Provider;
 - Payroll Date Notification;
 - Equal Employment Opportunity is the Law;
 - Industrial Welfare Commission Order Regulating Wages;
 - Notice to Employees: Unemployment and Disability Poster;
 - Discrimination in Employment is Prohibited by Law;
 - Notice: Employee Polygraph Protection Act; and
 - Any other local required postings.

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10.0 PLAN APPROVAL

This HSP has been written for use by the Jacobs team and any others who are authorized by the PHSM to have access to NAS Fort Worth JRB to conduct fieldwork in accordance with this HSP. This HSP is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these operations or conditions change.

Concurrence By:

Date:

Lynn Schuetter
Jacobs Project Manager

Prepared By:

Date:

Lisa Nelowet
Jacobs Health and Safety Manager, Denver

Plan Approved By:

Date:

Terry M. Briggs, Ph.D., CIH
Program Health and Safety Director
Jacobs Engineering Group Inc.

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11.0 REFERENCES

- American Conference of Governmental Industrial Hygienists (ACGIH). 1994. *Threshold Limit Values and Biological Exposure Indices*. 1993-1994.
- Jacobs Engineering Group Inc. undated a. *Corporate Health and Safety Manual for Environmental Field Programs*.
- Jacobs Engineering Group Inc. undated b. *Corporate Safety Manual*.
- U.S. Air Force. 1993 (September). *Handbook for the Installation Restoration Program (IRP) Remedial Investigations and Feasibility Studies (RI/FS)*. Brooks Air Force Base, Texas 78235-5328. Headquarters, U.S. Air Force Center for Environmental Excellence.
- U.S. Army Corps of Engineers. 1992 (October). *Safety and Health Requirements Manual*. EM 385-1-1.
- U.S. Code of Federal Regulations (CFR) Title 29, Parts 1900 to 1910.999.
- U.S. Department of Health and Human Services. 1990 (June). *NIOSH Pocket Guide to Chemical Hazards*. Publication No. 90-117.
- U.S. Department of Health and Human Services. 1985 (October). *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Prepared by National Institute for Occupational Safety and Health (NIOSH)/Occupational Safety and Health Administration (OSHA), U. S. Coast Guard, and U.S. Environmental Protection Agency (EPA), Washington, D.C.

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APPENDIX A
Employee Signoff

Employee Signoff

[illegible]

APPENDIX B
Hazard Communication

**HAZARD COMMUNICATION
AND
RIGHT TO KNOW STANDARDS**

Name: _____ S.S. No.: _____

Company: _____

1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), their use, location, and procedures for obtaining copies.
2. I have been informed that some of my work may involve exposure to toxic substances.
3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.
4. I understand that the employer must act upon a request in a reasonable amount of time to avoid the interruption of normal work operations but within 15 days.

Signature: _____

Date: _____

APPENDIX C

Generic Chemical Hazard Profiles

APPENDIX C

Generic Chemical Hazard Profiles

The following information is intended to be generic to provide a brief overview. Detailed information relevant to hazards associated with specific chemical substances of potential concern at this site are provided in Appendix G of this HSP.

Calibration Gases

Common pressurized gases used to calibrate air monitoring instrumentation include heptane, hexane, hydrogen, hydrogen sulfide, oxygen, and pentane. Under ambient conditions, these gases are flammable. The cylinders are pressurized; they can become mini-torpedoes if the valve stem is severed from the cylinder. Handle them carefully.

The primary routes of entry into the body are inhalation and skin absorption, so these substances should be handled in a well ventilated area. Symptoms of exposure include lightheadedness, nausea, headache, numb extremities, dermatitis, loss of appetite, chemical pneumonia, and giddiness. Exposure to elevated levels of such gases can damage the skin, eyes, and respiratory system, and can cause death.

Corrosives

Corrosives include acids, bases/caustics, and inorganic halogen salts. Some of the more common acids include acetic, citric, hydrochloric, hydrofluoric, nitric, perchloric, phosphoric, picric, and sulfuric acids. Some of the more common caustics include ammonia, ammonium hydroxide, potassium hydroxide, sodium hydroxide, and sodium hypochlorite. Inorganic halogen salts are compounds containing halogens (chlorine, bromine, fluorine) such as sodium chloride, potassium bromate, and sodium fluoride, which are corrosive to metals and finishes but are relatively insignificant health threats.

For the most part, corrosives are nonflammable, although the liquid forms are moderately to highly volatile. Perchloric acid (perchlorates) and picric acid when dry can be explosive.

The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Symptoms of exposure include tissue burns, nose and throat inflammation, and pulmonary edema. Corrosives can cause extensive damage to the respiratory system, skin, and eyes.

Metals

Metals commonly associated with batteries, paints, plating operations, and petroleum-based products include lead, arsenic, cadmium (a probable human carcinogen), chromium (a probable human carcinogen), copper, nickel, silver, tin, and zinc compounds. Petroleum-based products such as lubricants, especially leaded gasolines, contain organic lead compounds such as tetraethyl and tetramethyl lead, as well as assorted inorganic metals mentioned above and others such as antimony, barium, beryllium, cobalt, magnesium, manganese, and vanadium. Explosive powders used in ordnances also contain aluminum.

Metals pose a health hazard in their solid form, especially as airborne dusts. The primary routes of entry into the body are by inhalation, ingestion, and skin contact. Organic compounds such as tributyltin may penetrate the skin without producing appreciable local injury. Symptoms of exposure include eye, skin, and upper respiratory system irritation; headaches; insomnia; metallic taste in the mouth; lassitude; pallor; anorexia; constipation; abdominal pain; anemia; and tremors. Heavy metals can cause damage to the central nervous system, kidneys, respiratory system, and liver. Cancers of the lungs and bones are associated with metal intoxication.

Petroleum-Based Hydrocarbons

Lubricants, oils, fuels, and gasoline contain petroleum-based hydrocarbons such as benzene and its derivatives, naphthas, toluene, xylenes, and coal tar pitch volatiles. Coal tar pitch volatiles are also known as polycyclic hydrocarbons (PCHs) or polynuclear aromatics (PNAs). Benzene and PNAs are known carcinogens. Petroleum-based hydrocarbon materials also generally contain metal contaminants. (Refer to the metals profile.) Lubricants and waste oils are slightly to highly volatile and flammable. Fuels and gasoline are extremely volatile and flammable.

The primary routes of entry into the body are by ingestion and skin contact or dermal absorption. Inhalation of the more volatile constituents, such as toluene, xylenes, naphthas, and benzene (a known human carcinogen) and its derivatives, can be toxic. Acute symptoms of exposure include eye, skin, and upper respiratory system irritation, giddiness, confusion, headache, nausea, staggered gait, and fatigue. High-level and chronic exposure can cause damage to the liver, kidneys, and bone marrow, and can cause skin cancer and leukemia.

Solvents (Nonhalogenated) and Paints

Some of the more common constituents of nonhalogenated solvents and paint wastes include acetone, methyl ethyl ketone (MEK), toluene, xylenes, alkyl acetates, acrylates, and alcohols. These substances are slightly to highly volatile and are moderately to highly flammable.

Primary routes of entry into the body are by inhalation, ingestion, and dermal absorption. Symptoms of exposure include irritation of the eyes, skin, or upper respiratory system, headaches, drowsiness, dermatitis, dizziness, confusion, giddiness, and euphoria. Higher levels of exposure can cause narcosis and damage to the kidneys and blood.

APPENDIX D
Detailed Biological, Physical (Safety), and
Radiological Hazards and Controls

APPENDIX D

BIOLOGICAL HAZARDS AND CONTROLS

Poisonous Insects and Animals

Ants, Bees, Wasps, and Hornets

Stings from these insects are responsible for more deaths in the United States than bites and stings of all other venomous creatures. This is due to the victim's sensitization to the venom from repeated stings, which can result in anaphylactic reactions. The stinger may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine.

Recently African "killer" bees have been found in Texas. Fatalities associated with these bees have resulted when the victim has sustained incapacitating injuries from a fall or slip and cannot escape the bees. The "killer" bees have the ability to sting repeatedly. Their venom is no more potent than that of the common honey bee. Observe the same first aid procedures as those stated in the previous paragraph.

Poisonous Snakes

Avoid walking at night or in grass and underbrush. Do not climb rocky ledges without first visually inspecting them. Wear high-top boots and heavy pants; more than half of all bites are on the lower parts of the legs. Do not attempt to kill snakes unnecessarily; many people are bitten in such an attempt.

A snake may bite a person and not inject venom. Symptoms and signs of envenomation include the presence of fang marks; rapid and progressive swelling around the bitten area within five to 10 minutes; pain; weakness; faintness; nausea; vomiting; and alterations in temperature, pulse, and blood pressure. Emergency treatment does not include incision through the fang marks. Typically, that causes more harm than good. Immobilize the person and the bitten part in a horizontal position, with the bitten part lower than the heart. Wash the bitten area with water but avoid manipulation of the bitten area. Do not allow the person to walk, run, or drink alcoholic beverages or stimulants such as soda, coffee, or tea. Do not apply ice or give aspirin. Treat for shock and transport to the nearest medical facility. Death in humans can occur within less than one hour to several days, with most deaths occurring between 18 and 32 hours after the bite.

Spiders

Almost all of the 30,000 species of spiders are venomous, but only a relatively small number have fangs long and strong enough to penetrate the human skin. Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, or in pump housings and buildings.

Black widow spiders range in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. Although both male and female are venomous, only the latter has fangs large and strong enough to penetrate human skin. Mature females range in body length from 10 to 18 mm. The person who was bitten may recall receiving a sharp, pinprick-like bite, but in some cases the bite is so minor that it goes unnoticed. Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating, weakness, and varying degrees of headache and dizziness are common. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the lower back, thighs, or abdomen. There is no effective first-aid treatment. Treat for shock and transport to the nearest medical facility.

Brown Recluse or Violin Spiders have abdomens that vary in color from grayish through orange and reddish-brown to dark brown. The back shell of the "violin" is brown to blackish and distinct from the pale yellow to reddish-brown background of the head and chest. This spider has 6 eyes grouped in 3 diads. Both male and female are venomous. They average 6 to 12 millimeters in body length. The bite of this spider produces about the same degree of pain as the sting of an ant, but sometimes the person is completely unaware of the bite. In most cases, a localized burning sensation develops, which may last for 30 to 60 minutes. The area often itches and becomes red and warm with a small blanched area around the immediate bite site. The reddened area enlarges and becomes purplish during the subsequent one to 8 hours. A small blister forms at the bite site, increases in size, and subsequently ruptures. The entire area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea, and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. All first aid measures should be avoided as the natural appearance of the bite is most important in determining the diagnosis. A cube of ice may be placed on the wound. Transport to the nearest medical facility.

Ticks

Ticks can carry many diseases. Transmission of Lyme disease from ticks to persons has been studied. There is evidence that symptoms of the disease are not immediately apparent but begin after a period of time has passed. When in the field, check often for ticks. Ticks are best removed by applying gasoline or by slowly withdrawing the

tick with flat-tip tweezers. Care should be taken not to leave any part of the tick in the wound and not to crush the tick. If the tick resists or cannot be completely removed, seek medical attention. The bite should be cleansed and a corticosteroid lotion should be applied.

One of the symptoms of Lyme disease is a rash that looks like a "bull's-eye" with a small welt in the center. The rash visually develops several days to several weeks after the tick bite. Rocky Mountain Spotted Fever, which is also transmitted by ticks, also causes a rash of red spots under the skin three to 10 days after the bite. Both diseases cause chills, fever, headache, fatigue, stiff neck, and bone pain. Seek medical attention.

Poisonous Plants

Poison oak and poison ivy are bush-like plants. Poison oak and poison ivy are identified by three or five leaves radiating from a stem. The plant tissues have an oleoresin that is active in live, dead, and dried parts. The oleoresin may be carried by smoke, dust, contaminated clothing, and animal hair. Signs and symptoms include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24 hours. Crusting and scaling occur within a few days. In the absence of complications, healing is complete in approximately 10 days. Wash any exposed skin with a mild soap and water but do not scrub the area.

Rodents

Recently, a fatal respiratory illness has been associated with a Hantavirus. This respiratory illness has symptoms similar to the flu. Without medical intervention, the victim experiences respiratory and cardiac failure. This virus is shed in the droppings and urine of infected rodents, mice, and rats.

Any droppings (small rod-like, dry material), nesting activities, or dead animals are to be reported immediately to the SHSC or SM. A decision will be made as to the proper method of eliminating the infestation and cleaning up droppings.

PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Possible physical hazards associated with field activities at the site may include any of the hazards discussed below. The controls specified shall be implemented during site operations. For additional information, refer to the Corporate Health and Safety Manual for Environmental Field Program and the Corporate Safety Manual.

Noise

The main sources of noise for this project are industrial operations, vehicles, concrete cutters, drill rigs, generators. Hearing protection must be worn in areas where noise levels are at the permissible exposure limit (PEL) of 85 dBA or greater. Hearing protection is required when, at 3 feet apart in normal conversation, voices must be raised to be heard. A Type II sound level meter should be used to measure site noise to verify sound levels and determine the need for hearing protection. Hearing protection should be specified by the PHSM or SHSC based on measured levels at the site.

Precariously Positioned Objects

Field personnel shall become familiar with the general area and the potential physical hazards associated with debris or objects (e.g., drums, boards) that may be piled or scattered around the sites. If objects are stacked in an unsafe manner, the PHSM shall notify the client site contact. Field activities shall not begin until station personnel remove or safely restack the objects.

Walking and Working in Open Terrain

Field personnel shall become familiar with the general terrain of the site and potential physical hazards (evaporation ponds, uneven terrain, etc.) that would be associated with accidental slips, trips, and/or falls.

Tagging of Defective Tools, Materials, or Equipment

Defective tools, materials, and equipment that could impact personnel safety or the environment shall not be used. When a defective tool, material, or piece of equipment is found, the contractor shall take it out of service immediately by tagging, destroying, or removing it from the project. Danger tags shall be dated, sequentially numbered, and signed by the supervisor. A defective equipment log shall be maintained.

Housekeeping

The contractor will strictly enforce housekeeping. Poor housekeeping is a sign of a poorly managed project and is the root of many safety problems. All material, scrap, tools and toolboxes, and other equipment shall be stored in a neat and orderly fashion. Trash and scrap shall be removed from the work area on a regular basis (i.e., at least daily before the end of each work shift) and shall never be allowed to accumulate, especially in walkways, under stairs, at the bases and landings of stairs and ladders, and near flammable substances.

Housekeeping will receive a major emphasis during daily and weekly contractor inspections. If the contractor determines that housekeeping has become a problem, the contractor reserves the right to stop work and require a cleanup before work resumes.

Illumination

Adequate lighting is extremely important for the safe execution of work. The minimum illumination intensity shall be 5 foot-candles in all active work areas and accessways. In specified areas outlined in the OSHA standard, 29 CFR 1926.56, the required intensity ranges as high as 20 foot-candles. Lighting intensity will be surveyed during the regular contractor job site inspections.

Slip, Trip, and Fall Hazards

Falls as a result of slipping or tripping are the most common form of injury on construction sites. These injuries are a result of poor housekeeping, lack of attention to detail, or carelessness.

Slipping hazards such as grease, oil, water, ice, snow, or other liquids shall be cleaned up or eliminated on walkways, ladders, scaffolds, or other accessways or working areas. If slipping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

The construction site, especially roadways, accessways, aisles, stairways, scaffolds, and ladders, shall be kept clean and clear of hoses, extension cords, welding leads, and other obstructions that may cause tripping or other accident hazards. If tripping hazards cannot be eliminated completely, the area shall be barricaded and posted with applicable hazard postings.

Fire Protection and Prevention

The subcontractor shall take all necessary and appropriate precautions to prevent fires. Sufficient water and fire fighting equipment shall be available at all times to control

fires as specified below. All heavy equipment must be equipped with 5-pound dry chemical fire extinguishers rated A:B:C. A 10-pound dry chemical fire extinguisher rated A:B:C must be located in all trailers per The National Fire Protection Association (NFPA) 10 Standard. A 20-pound fire extinguisher rated A:B:C must be provided within 50 feet, but no closer than 25 feet, to all fueling operations and flammable storage areas.

All fire extinguishers shall be mounted on walls or stands with a red background. Fire extinguishers shall not be mounted with the top less than 3 feet or greater than 5 feet above the floor. Access routes to fire extinguishers shall be kept clear at all times. All fire extinguishers shall be inspected monthly, annually, and every 6 years in accordance with the NFPA 10 Standard on fire extinguisher inspections.

Open burning of trash and debris shall not be permitted. If there is a danger of accidental fire, e.g., during cutting or welding operations, a person shall be designated as fire watch and shall be dedicated solely to this effort during that operation and shall continue this duty for 30 minutes after the operation is completed.

Internal combustion engines will not be permitted to operate in buildings unless authorized by the contractor. Engines shall be turned off while refueling. Storage of flammable fuels will be carefully monitored. All fuel storage areas and storage tanks must have written approval by the contractor. Marking and labeling of fuel tanks shall meet the requirements of OSHA 29 CFR 1926.59. All heating devices and their locations must be inspected by the Contractor Safety Department before use. Fueling areas and tanks shall comply with all applicable NFPA and OSHA requirements.

Flammable or combustible liquid storage shall comply with NFPA 30 and OSHA 1926.152. All fuel cans, such as 5-gallon gas cans, shall be free of deformities and constructed of metal, with self-closing lids and flame arresters. Fuel cans shall be labeled with their contents. All equipment shall be fueled through funnels or spouts to prevent spills.

Material Handling and Storage

All new material shall be stored on dunnage. All material shall be stored and secured as necessary to prevent blowing, falling, sliding, or collapsing. Debris and scrap material need not be stored on dunnage if the material will not be moved with rigging and can be maintained in a stable manner. Jacobs and all subcontractors shall ensure that material is stored properly to prevent scattering or lost equipment.

Walkways and aisles shall be kept clear at all times, and laydown areas shall be neat and orderly. Material shall be stored on level ground, and the boundaries of laydown areas shall be identified. Material shall not be stored within 6 feet of hoistways or

floor openings, or within 10 feet of roof edges. Poles, pipe, and other stock that may roll shall be wedged to prevent spreading and rolling.

Nails shall be removed from lumber that is to be reused. Nails in scrap lumber that will not be rehandled shall be bent back.

No material, tools, or equipment shall be leaned against other objects or walls unless they are secured from movement. Employees moving material by hand shall use proper lifting techniques and gloves. Safe working load limits shall be labeled on all temporary elevated floors or platforms and these limits shall not be exceeded.

Tools

All tools shall be kept in good condition and properly stored. Tools shall not be altered, and they shall be used only for their intended purposes. Guards shall not be removed from tools, and all nip points, open drums, and fly wheels shall be guarded. All tools shall be inspected by the user before use, with special attention to power cords and the condition of teeth. If a power cord has been repaired more than once, the tool shall be tagged defective, and not used until a new power cord is installed. Drawings of job-built jigs and tools shall be submitted to the contractor. Owners' manuals shall be available to the contractor upon request, and subcontractor personnel shall be trained in the safe operation of all tools used.

Power tools shall be equipped with constant pressure switches that will shut the tool off when the switch is released. All power tools and electrical equipment shall be double insulated or be equipped with ground plugs.

Employees using powder-actuated tools shall be certified and have on their person a card stating such. The loads for powder-actuated tools shall be kept in a locked red box labeled "EXPLOSIVES", which shall be kept in a locked area with restricted access.

All bench-mounted and floor-mounted tools shall be secured. Bench-mounted grinders shall be set up and operated according to 29 CFR 1926.303. Tools equipped with handles shall have the handles installed. Cracked, splintered, or taped wooden handles shall be replaced. Cheater bars will not be permitted. Impact tools shall be free of mushroomed heads and cracks. Workbenches and sawhorses shall be provided when needed.

Torch/Plasma Arc Cutting, Welding, and Open Flame Requirements

The SM shall identify the need to conduct cutting, burning, or open flame work. When the need has been identified, the contractor supervisor shall complete

Cutting/Welding/Open Flame Permit. The permit is then submitted to the SM for review.

At a minimum, fire prevention equipment shall consist of one 10-pound, dry chemical extinguisher rated A:B:C. A live water line meeting the requirements of OSHA 29 CFR 1926.150 or a water pump extinguisher may be used as a supplement to the dry chemical extinguisher. The work area shall be barricaded and posted; the equipment shall be inspected and exits identified.

The approved permit shall be posted in the work area. Adjoining work areas shall be inspected and workers in the immediate vicinity shall be notified.

Upon completion of the above requirements and the precautionary items addressed in the permit, work may commence. The permit may be issued for more than 1 day; however, a daily safety checklist shall be completed by the subcontractor supervisor.

Upon completion of work activities, the permit and checklist shall be returned to the contractor construction engineer.

Torch/plasma arc cutting or welding on galvanized steel, stainless steel, or nonferrous metals shall not be permitted unless half-face or full-face air purifying respirators with high-efficiency particulate air (HEPA) cartridges or equivalent engineering controls (local exhaust with HEPA filtration) are provided. Full-face respirators with HEPA cartridges shall be required during torch cutting on radiologically contaminated metals and metal with lead or cadmium-bearing coatings.

Torch/plasma arc cutting shall not be used on wood, synthetic materials, rubber-lined pipe and vessels, or on any process piping, tanks, vessels or equipment containing significant radioactive material product residues unless approved by the contractor.

Any torch/plasma arc-cutting operation that may expose workers to contaminants in excess of the action level, without regard to the use of respirators, shall be controlled with the use of local exhaust ventilation in conjunction with a high-efficiency particulate collection system. If gaseous or vapor exposure limits are exceeded, respirators with appropriate cartridges shall be used.

Compressed gas cylinders shall be secured in an upright position at all times. Burning rigs shall be broken down at the end of each shift. Fuel gas hoses shall be stored in a ventilated area (never in gang boxes). Compressed fuel gas cylinders shall not be taken into confined spaces. All other rigs shall be stored in accordance with OSHA standards. Empty cylinders shall be removed at the end of each shift. Burning rigs shall be equipped with backflow preventers at the torch end of each hose.

If there is the potential for accidental fire during burning or welding operations, a fire watch shall be established and continued until 30 minutes after the work has been

completed. When there is possibility of injury during burning or welding operations, overhead burning signs and welding blinds shall be installed. A 10-pound dry chemical fire extinguisher rated A:B:C must be readily available to any welder or employee operating a burning or welding rig.

Welding leads, including lugs on the welder and lead connections, shall be fully insulated at all times. Damaged leads and dry-rotted fuel hoses shall be removed from service.

The subcontractor shall notify the contractor if any welding or burning is to be done from a suspended platform. The subcontractor will be required to comply with contractor requirements during such operations. Requirements may include the use of multiple fire watches, covering flammable/combustible materials below the work platform, or other safety measures.

Electrical

Work on energized circuits will not be permitted at the site.

Ground fault circuit interrupters (GFCIs) will be required at all times. Lighting must be hooked up to a GFCI unless the electrical connections are different from all other electrical hookups and cannot be mistakenly exchanged.

Electrical panels, boxes, etc., with open knockouts through which no service has been installed must be covered. Electrical cords and equipment shall not be hung or tied to steel or hung with wire unless a nonconductive material is used to insulate the cord from the metal. Plastic coated wire shall not be used to hang electrical cords. All lights must be equipped with protective, nonconductive covers, and all light bulbs in light stringers must be shatterproof. Cords that pass through doorways or holes or are exposed to vehicle traffic shall be protected from damage. Flexible electrical cords shall not be spliced or have insulation repaired with tape. Only SO-type cords or equivalent shall be used for light stringers.

All breaker boxes, electrical receptacles, and feed lines shall be labeled to identify the "from" and "to" circuits. All breaker boxes and disconnects shall be provided with unobstructed access 36 inches in front of the unit. All 480-volt lines shall be labeled clearly. When passing over or through walkways, electrical cords shall be strung at least 7 feet above the walking surface. The subcontractor shall comply with codes in the current NFPA and National Electric Codes (NEC).

Ladders

All ladders shall be inspected before use and stored on dunnage or ladder racks. Tools and material shall not be left on top platforms of unattended ladders, and material shall never be stored on ladders. All ladders shall be labeled with legible manufacturer

instructions and warning labels. Ladders shall not be painted except for identification marks.

All ladders shall be type 1A and shall be wooden or have fiberglass siderails with metal rungs. The bases and landings of all ladders shall be kept clear of obstacles. Stepladders shall not be used as straight ladders, and extension ladders shall not be separated for use. All ladders shall be equipped with skid-resistant feet. If a ladder is used in a doorway, the doorway must be barricaded. Ladders shall not be used in lieu of elevated work platforms.

Employees shall never carry material when climbing ladders, nor shall tools or equipment be thrown to or from personnel on ladders. Handlines shall always be used to hoist material. Personnel shall not climb to the top step or top platform of any ladder. When in use, ladders shall be held or secured by tying off. Personnel working on ladders shall not straddle the ladder or overreach so that the body is no longer between the siderails.

Job-built ladders shall be inspected by a competent person and shall meet the OSHA standard. In addition, all job-built ladders shall have a furring strip attached over the filler block and rung.

Scaffolding

Scaffolding shall be erected and used according to the most stringent interpretation of the applicable safety regulations. Only heavy-duty (75 pounds per square foot [psf]) scaffolds will be permitted. All scaffolding shall be erected and inspected by a competent person. Samples of the Stationary Scaffolding Inspection Checklist and Rolling Tower Inspection Checklist are provided. All scaffolding shall be built as completely as possible. This means all decks must be complete (e.g., if a handrail can be installed, it must be installed, and the scaffold must have ladder access and gates).

If a chain or slide bar is used as a gate, a landing between the ladder and the gate shall be erected so that personnel can leave the ladder safely before unchaining the gate or moving the slide bar. All scaffolds shall be equipped with handrails (if possible), regardless of the height of the scaffold. If personnel are required to work under or pass under a scaffold, the area between the guardrail and toeboard shall be screened with No. 18 gauge 0.5-inch mesh wire or equivalent.

Aluminum scaffold boards shall be used whenever possible. Scaffold boards shall not be notched, nailed, used as bearers, or used on the ground as walkways. All scaffold boards shall be cleated and tied with No. 9 gauge wire to prevent displacement. Scaffold boards shall be placed together tightly with a maximum space of 0.25 inch between the planking and toeboard. Crawling boards and chicken ladders are prohibited.

The subcontractor shall submit to the contractor a tagging and inspection system for scaffolds and other elevated work platforms. This system shall include the method of determining if scaffolding is under construction or unsafe, requires a safety harness, or is approved for use. It shall also include the date on which the scaffolding was last inspected and the name of the inspector. The subcontractor may elect to use the contractor's procedure, *Scaffold Inspection Tagging*, by indicating this intention in writing to the contractor. A copy of the procedure will then be provided by the contractor. All scaffolds shall be equipped with legs and base plates and shall be placed on mud sills.

Parts from scaffolds made by different manufacturers shall not be interchanged. Welded frame scaffolding shall not be repaired or altered. **Anti-sway bars shall be installed on all rolling scaffolds;** only welded frame scaffolds may be used as rolling scaffolds. Personnel shall not ride on rolling scaffolds.

All scaffolds must be plumb and tied off every 15 feet or three times the minimum base dimension, whichever is the most conservative. Scaffolding without handrails shall be placed no more than 4 inches from a wall. Drawings of all two-point suspended scaffolds and needle beam scaffolds shall be submitted to the contractor before such scaffolding is erected.

All scaffolding higher than 50 feet, as measured from the base plate, shall be designed by a registered professional engineer. Such designs shall be submitted to the contractor for review and approval.

Power-Driven Staging and Platforms

All equipment discussed in this section must be inspected by the contractor before initial use and by the subcontractor prior to every use. In addition, a documented inspection by a competent person must be conducted quarterly.

All operators of power-driven staging and platforms shall be trained in their use, and the training records shall be submitted to the contractor. Owners' manuals and drawings of connection methods for all such equipment shall also be submitted to the contractor. A copy of the owner's manual shall also be kept on each platform. All power-driven staging and platforms shall be placarded properly, and controls shall be labeled clearly.

Operators shall use a check sheet during pre-operational inspections and shall verify the inspection by signing the sheet. The subcontractor shall keep these check sheets on file. All manufacturer's recommendations for inspections and operation shall be followed. The contractor will provide a check sheet if requested.

Handrails and complete midrails shall be kept in good repair. Secondary lifelines shall always be used on power staging, and all personnel on power platforms shall be tied off.

Power platforms shall not be used to hoist material nor shall personnel exit platforms except when the platform is on the ground. If welding or cutting operations are performed on a power platform, the loadlines and lifelines shall be protected.

Manbaskets

Manbaskets shall not be used except when the total exposure of performing the task by another method would be more hazardous. The contractor will inspect manbaskets before initial use, and the subcontractor will inspect them prior to each use. Test lifts and crane requirements will be enforced strictly. Manbasket design shall be approved by the contractor.

A checklist shall be completed and signed during pre-lift meetings, and safety instructions shall be read by personnel entering the basket as well as by the crane operator. Copies of this checklist may be obtained from the contractor.

All manbaskets shall be equipped with overhead protection. When cutting or welding is being done from a manbasket, the rigging shall be protected. During welding, a nonconductive link shall be installed on the load line. Only rigging that has never been used for any other purpose shall be used with the manbasket.

Signs, Barricades, Guardrails, Handrails, Covers, Stairs, Decks, and Ramps

All signs shall be colored properly and labeled as prescribed by the OSHA standard. Signs shall be constructed of metal, fiberglass, or plastic and shall be removed promptly when no longer needed.

The types of barricades permitted on the project include rope, tape, and hard barricades. The color of the barricades shall coincide with the OSHA color classifications. If hazard information is not provided on a barricade, signs or tags shall be attached to it at 20-foot intervals. If hazard information is not printed on barricades at doorways, signs or tags shall be attached to the doorways. Rope, tape, chain, and similar barriers used to designate the boundaries of posted radiological areas shall be yellow and magenta. Construction fences are physical barriers and need not be yellow and magenta.

Tape barricades shall be installed at a height of 42 inches and at a distance of 5 feet from the hazard. If a hazard is more than 10 feet high, the barricade shall be 1 foot farther away for each additional 5 feet of hazard height. Hard barricades may be adjacent to hazards unless the hazard is elevated. Hard barricades shall be 42 inches

high, include midrails, and be capable of withstanding a 200-pound force in any direction. If work is taking place beneath a barricaded area, hard barricades shall be equipped with toeboards. If the area below is a walkway or passageway, the area between the barricade midrail and toeboard shall be screened or blocked. All areas where there is a potential for falling objects shall be barricaded.

Turnbuckles shall be used when a barricade is constructed of wire rope.

Guardrails shall be erected whenever a walking surface changes elevation by more than 2 feet. Tape barricades may be used for this purpose, but such a barricade must be 5 feet from the change in elevation. All changes in elevation shall be marked with some kind of warning such as yellow and black tape or fluorescent orange paint. Handrails shall have smooth surfaces or be taped to prevent splinters. All wall openings shall be guarded. When a door opens onto a platform, the width of the door shall not reduce the effective width of the platform to less than 20 inches.

Runs and risers on all stairs shall be constructed in accordance with OSHA regulations. Ramps shall have a maximum angle of 7 degrees.

Stairs leading to office and warehouse trailers shall be anchored firmly and equipped with handrails. Risers, including the top and bottom steps, shall be of equal height.

Floor hole covers shall be labeled "WARNING – TEMPORARY HOLE COVER – DO NOT REMOVE OR STORE MATERIAL." Hole covers shall be cleated and constructed of 0.75-inch plywood with supports 18 inches on center or less.

Roofs

Before any maintenance work is done on roofing, a solid working surface shall be provided with all the openings guarded and skylights protected. A tape barricade shall be erected 6 feet from the edge of any unprotected roof edge. Personnel crossing barricades shall wear a full body harness attached to retractable block lifelines.

Before any demolition work is done on roofing, the subcontractor shall have an engineering survey performed by a registered Professional Engineer.

Rigging

General

All rigger's signal men shall be trained properly and provided with a rigging handbook. Documentation of training shall be provided to the contractor. All rigging shall be performed in accordance with the *Department of Energy Hoisting and Rigging*

Program Manual (Ref. 6), which will be available from the contractor upon request. Major rigging operations must be planned and supervised by competent personnel to ensure that the best methods and most suitable equipment are employed.

The contractor shall have the authority to cancel hoisting and rigging operations based on consideration of weather, condition of lifting hardware, electrical line clearances, or any other factor that, in the judgment of the contractor, may adversely affect the successful conclusion of the lift. All rigging must be protected from flame cutting and electric welding operations and from contact with solvents and chemicals.

Equipment Inspection and Testing

When specially fabricated devices are required for hoisting and rigging operations (e.g., lifting beams, material baskets, and spreader beams), the design and calculations for the device shall be reviewed and approved by the contractor.

All rigging shall be inspected by a competent person before each use and marked as inspected at least annually. All rigging shall be labeled clearly with its capacity. All rigging shall be stored in a rigging loft or an equivalent area where it will not be exposed to the elements.

Job-built rigging and hoisting equipment shall be tested onsite at 125 percent capacity, and such tests shall be observed and documented by the contractor. In addition, drawings of such rigging showing weld details and load capacities shall be submitted to the contractor and approved before the rigging is used.

Hoisting and rigging equipment for material handling shall be inspected visually prior to use on each shift, and as necessary during its use to ensure that it is safe. Hoisting and rigging equipment shall be load-tested at least annually by a competent person, who, by training and experience, is capable of recognizing defects and taking the appropriate action to correct or eliminate them. Inspections shall be documented and made available to the contractor.

Safe Working Loads

Hoisting and rigging equipment shall not be loaded in excess of its recommended safe working load, as prescribed in Tables H-1 through H-20 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Material Handling*). Special hoisting devices, slings, chokers, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to initial use to 125 percent of their rated load.

The load weight must be determined before it is rigged. The gross load which is the sum of the weight of the rigging, block, hooks, lifting beam, stowed or erected jibs, headache ball, other elements of rigging or equipment and the load, must be accounted

for when determining hoisting equipment. Safe working loads of hoisting equipment apply only to freely suspended loads on plumb hoist lines. If hoist line is not plumb, additional side loads will compromise the stability and introduce stresses which exceed equipment designs. Rapid swinging of loads also adds additional stresses and minimizes stability. The load must always be directly below the boom point or upper load block.

The center of gravity must be below the hook and below the lowest point of attachment to ensure stability. Softeners must be used to protect slings at sharp corners. Sharp bends, pinching, and crushing should be avoided. The eye section of wire rope slings must not be bent around corners.

Alloy Steel Chains

Chains shall not be used for lifting except as part of a chainfall or come-along device.

Wire Ropes

Wire ropes shall be kept in good repair and without deformities. Wire ropes with visual signs of kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion, loss of rope diameter, unevenness of outer strands, corrosion, heat damage, abrasion, broken wires or strands and cracked, worn, or deformed end attachments should be considered in evaluation of sling replacement. Wire rope shall not be used if in one rope lay there are 10 randomly distributed broken wires or five broken wires in one strand.

Tables H-3 through H-14 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope and wire rope slings with various types of terminals. For sizes, classifications, and grades not included in these tables, the safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than 5 is maintained. Wire rope with protruding ends of strands in splices on slings and bridles shall be covered or blunted. Wire rope application use limitations shall be in accordance with 29 CFR 1926.251(c)(4). When U-bolt wire rope clips are used to form eyes, Table H-20 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the number and spacing of clips. A minimum of three clips shall always be used. More clips may be needed when large-dimension wire is used.

Slings

Synthetic slings shall be maintained carefully. Any synthetic sling with the red warning line exposed is to be removed immediately regardless of the extent of the exposure and the use of the sling.

Slings should not be dragged from beneath loads. Knotted and kinked slings will be considered permanently damaged and shall be removed from the site. When estimating sling capacity using multi-legged slings, only two of the legs shall be considered to carry the full load. All loose pieces of material shall be removed from the load prior to moving. Gloves shall be worn when handling wire rope. Hands shall be kept free from pinch points as slack is taken up. The load shall be controlled at all times. Personnel shall keep body parts out of pinch points. Tag lines shall be used.

Tables H-15 through H-18 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*), shall apply when using natural or synthetic fiber rope slings.

All splices in rope slings shall be made in accordance with fiber rope manufacturer's recommendations and 29 CFR 1926.251(d)(2).

Synthetic webbing (nylon, polyester, and polypropylene) shall be identified by the name of the manufacturer, the rated capacities for the type of hitch, and the type of material.

Synthetic web slings shall be removed from operation immediately if there are signs of acid or caustic burns, melting or charring of any part of the sling surface, snags, punctures, tears or cuts, broken or worn stitches, distortion of fittings, discoloration or rotting, or red warning line showing.

Shackles, Hooks, and Bolts

Table H-19 of OSHA 29 CFR 1926, Subpart H, (1926.251, *Rigging Equipment for Materials Handling*) shall be used to determine the safe working loads of various sizes of shackles.

Only one-eye hooks shall be used, and hooking back to the load line will not be permitted in either mechanical rigging or hand rigging. Only one eye of a sling shall be used in a hook. A shackle shall be used to hold two or more eyes. The pin of the shackle should be placed in the hook with the eyes of chokers bearing on the shank.

Only shouldered eyebolts shall be used, except where it is not possible due to the configuration of the item to which the eyebolt is attached. Unshouldered eyebolts shall not be used when the load is to be lifted at an angle, because they are subjected to bending, and the load they can safely carry is severely reduced. Eyebolts should never be welded. Shouldered eyebolts must be installed with the shoulder at a right angle to the axis of the hole and must contact the working surface to keep bending to a minimum; the loads should be applied to the plane of the eye. The tapped hole for screwed eyebolts shall have a minimum depth of one and one-half times the bolt diameter. The point of a hook must never be inserted in an eyebolt; a shackle must be

used instead. A sling must not be reeved through pairs of eyebolts. One single leg should be attached to each eyebolt.

The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall not be used.

Shackles and hooks shall be constructed of forged alloy steel with the identifiable load rating and manufacturer on the shackle or hook. All hooks except for sorting hooks and sliding choker hooks shall be equipped with a safety latch.

Knots

Knots shall not be tied in rigging for any purpose, and all rigging shall be used only for its intended purpose. Rigging used to hoist manbaskets shall be identified as such and not used for any other purpose.

Weather Conditions

No rigging or hoisting operation shall be carried out when weather conditions could cause the operation to be hazardous to personnel or property. The size and shape of loads must be examined to determine if a hazard exists during high winds. Wind loading may not exceed equipment capacity. When wind speeds reach 25 to 30 mph, or when visibility is impaired by darkness, snow, fog, or rain, the operation shall be suspended.

When the temperature is below freezing, caution must be used to ensure that no part of the hoisting equipment is shock loaded, as steel fracture can result. Stress factors that reduce rigging capacity and safe working load must be considered when using slings at angles or when slings are choked.

Motor Vehicles and Heavy Equipment

Drivers and/or operators of vehicles and heavy equipment must have the appropriate state license certifying their qualifications to drive or operate each piece of equipment or vehicle. When state certification is not available for a piece of heavy equipment, the subcontractor shall submit to the contractor a certificate of operator qualification for each operator, listing each piece of heavy equipment that the operator is qualified to operate.

Drivers shall be responsible for the safety of all passengers and the stability of materials being hauled. Personnel shall not mount or dismount moving vehicles. Personnel shall not ride in the bed of any vehicle. Every passenger in a motor vehicle

shall have a safe place to ride. The use of seat belts shall be mandatory when operating or riding in vehicles.

Unattended vehicles and heavy equipment shall not be left running. If the operator is to get out of or off of the equipment, it must be shut down properly.

All blades and buckets shall be lowered when the operator leaves the cab unless physically locked or properly blocked.

Heavy equipment shall be maintained in proper operating condition at all times. All machines shall be equipped with roll-over protective structure (ROPS) cabs. Operators shall be trained in the proper method of working on slopes.

All heavy equipment with ROPS cabs shall be labeled as required by 29 CFR 1926.1000. Seat belts shall be installed and used in all equipment with ROPS attachments except for compactors and rubber-tired skid steer equipment. All heavy equipment shall be equipped with functioning back-up alarm systems that are clearly audible above surrounding noise.

All equipment and tools shall be subject to an inspection, conducted by the contractor, upon arrival at the site and prior to being placed into service. Operators shall perform daily inspections of machinery and equipment. Records of these inspections shall be made and kept by the subcontractor. These records shall be available to the contractor upon request. Defective equipment that could endanger personnel or the environment shall be tagged defective, and repaired immediately or removed from service. All machinery shall be subject to inspection by the Contractor Safety Department. Owners' manuals shall be made readily available upon contractor request.

Oils or other fluids (except water) that leak onto the ground shall be cleaned up by the subcontractor, and the contaminated soil shall be disposed of in accordance with the Environmental Cleanup Plan.

All equipment is designed for a particular function and shall be operated according to the manufacturer's recommendations and within the manufacturer's limitations. For lifting operations with equipment other than cranes, prior written approval must be obtained from the contractor.

Documenting Task Completion

Upon completion of the excavation, the subcontractor shall prepare as-builts and transmit them along with the completed permit, SWPs, and/or TaSSAs to the construction engineer.

Enforcing Permit Requirements

Failure to obtain a permit, or noncompliance with the conditions required by the approved permit, may result in an operational suspension of the activity until an approved permit is issued and/or a CAS-21 Safety Violation Notice is completed.

Demolition

All personnel safeguards that apply to the construction of a building will be required during demolition. If a worker is exposed to a hazard, the hazard shall be abated or personnel shall be removed from the hazard area. Fall hazards — such as floor openings, unprotected platforms, and wall openings — to which employees will be exposed shall be mitigated.

An engineering survey must accompany the Safe Work Plan. However, this survey is not a substitute for the Safe Work Plan. The professional engineer who authors the engineering survey must tour all the buildings that are included in the survey.

Use of explosives may be permitted for demolition of uncontaminated structures; however, a detailed Safe Work Plan will be required before such use is approved.

As indicated in the subcontract specifications, the subcontractor shall use water spraying or other contractor-approved methods as necessary to suppress dust emissions.

Traffic Control

The subcontractor shall be responsible for orderly traffic control on the job site. All traffic control measures on public roadways shall be in accordance with Transportation Department regulations for use of flagmen, construction barriers, and appropriate distance requirements. The subcontractor shall provide traffic signs and/or signalmen where and when necessary to protect personnel and/or the general public.

APPENDIX E
Site Tailgate Meeting and Exclusion Zone Entry Log

APPENDIX E SITE TAILGATE MEETING and EXCLUSION ZONE ENTRY LOG

Facility: _____
 Date: _____
 Client: _____ Time: _____ Project Number: _____
 Specific Location: _____
 Type of Work: _____
 Chemicals Brought to Site: _____

MSDSs Available: Yes _____ No _____

HEALTH AND SAFETY TOPICS PRESENTED

Protective Clothing/Equipment: _____
 Chemical Hazards: _____
 Physical Hazards: _____
 Emergency Procedures: Apply First Aid and notify Health and Safety immediately _____
 Hospital/Clinic: _____
 Hospital Address: _____
 Special Equipment: _____
 Evacuation Route: _____

ATTENDEES

Entered Exclusion Zone? (Y/N)	NAME (Printed)	SS#	COMPANY	SIGNATURE

MEETING CONDUCTED BY:
 NAME (printed) _____

(signature) _____

APPENDIX F
Visitor's Log



Project Name:	Project No.:	Date:
OU No.:	Site No.:	

[illegible]

APPENDIX G

Material Safety Data Sheet (MSDS) Information

APPENDIX G - MSDS INFORMATION

Hexane

Hydrochloric Acid

Isobutylene

Methanol

Nitric Acid

Sulfuric Acid

Hexane

Baxter Healthcare Corporation
Burdick & Jackson Division
1953 South Harvey Street
Muskegon, MI 49442 USA

382 108

information/emergency telephone no. 616.726.3171
chemtrec telephone no. 800.424.9300
canadian emergency telephone no. 613.996.6666

**MATERIAL SAFETY
DATA SHEET****HEXANE****I. Identification**

chemical name Hexane molecular weight 86.18
chemical family Aliphatic Hydrocarbon formula C₆H₁₄
synonyms n-Hexane
DOT proper shipping name Hexane
DOT hazard class Flammable Liquid
DOT identification no. UN1208 CAS no. 110-54-3

II. Physical and Chemical Data

boiling point, 760mm Hg. 68.7°C freezing point -95.3°C evaporation rate (BuAc=1) ca 10
vapor pressure at 20°C 124 mm Hg vapor density (air = 1) 3.0 solubility in water @ 20°C 0.014%
% volatiles by volume ca 100 specific gravity (H₂O = 1) @ 20°C 0.659 stability Stable
hazardous polymerization Not expected to occur.
appearance and odor Clear, colorless liquid with a mild hydrocarbon odor.
conditions to avoid Heat, sparks, open flame, open containers, and poor ventilation.

materials to avoid Strong oxidizing agents.

hazardous decomposition products Incomplete combustion can generate carbon monoxide and other toxic vapors.

III. Fire and Explosion Hazard Data

flash point, (test method) -26°C (Tag closed cup) auto ignition temperature 225°C
flammable limits in air % by volume: lower limit 1.1 upper limit 7.5
usual fire and explosion hazards Very volatile and extremely flammable.

extinguishing media Carbon dioxide, dry chemical or foam.

special fire fighting procedures Water will not be effective in extinguishing a fire and may spread it, but a water spray can be used to cool exposed containers. Wear full protective clothing and self-contained breathing apparatus.
Heat will build pressure and may rupture closed storage containers.

IV. Hazardous Components

Hexane and isomers % ca 100 TLV 50 ppm CAS no. 110-54-3

Burdick & Jackson's Disclaimer: The information and recommendations presented in this Material Safety Data Sheet are based on sources believed to be reliable on the date hereof. Burdick & Jackson makes no representation on its completeness or accuracy. It is the user's responsibility to determine the product's suitability for its intended use, the product's safe use, and the product's proper disposal. No representations or warranties, either express or implied, of merchantability or fitness for a particular purpose or of any other nature are made with respect to the information provided in this Material Safety Data Sheet or to the product to which such information refers. Burdick & Jackson neither assumes nor authorizes any other person to assume for it, any other or additional liability or responsibility resulting from the use of, or reliance upon, this information.

V. Health Hazards

Occupational Exposure Limits

OSHA TWA - 50 ppm
 STEL - not listed
 Ceiling - not listed

ACGIH TLV-TWA - 50 ppm
 TLV-STEL - not listed
 (15-min)

NIOSH 10 hour TWA - 100 ppm
 15 min Ceiling - 510 ppm

Concentration Immediately Dangerous to Health

OSHA/NIOSH 5,000 ppm

Odor Threshold

NSC not listed
 NIOSH not listed

Carcinogenic Data

Hexane is not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

Primary Routes of Entry

Hexane may exert its effects through inhalation, skin absorption, and ingestion.

Industrial Exposure: Route of Exposure/Signs and Symptoms

Inhalation: Exposure can cause dizziness, numbness of extremities, and intoxication.

Eye Contact: Liquid and high vapor concentration can be irritating.

Skin Contact: Prolonged or repeated skin contact can cause irritation and dermatitis through defatting of skin.

Ingestion: Can cause gastrointestinal tract discomfort.

Effects of Overexposure

Hexane is a mild eye and mucous membrane irritant, primary skin irritant, central nervous system depressant and neurotoxin. Acute exposure causes irritation, narcosis, and gastrointestinal tract irritation. Chronic inhalation causes peripheral neuropathy. No systemic toxicity has been reported.

Medical Condition Aggravated by Exposure

Preclude from exposure those individuals susceptible to dermatitis.

Emergency First Aid

- Inhalation:** Immediately remove to fresh air. If not breathing, administer mouth-to-mouth rescue breathing. If there is no pulse administer cardiopulmonary resuscitation (CPR). Contact physician immediately.
- Eye Contact:** Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.
- Skin Contact:** Flush thoroughly for at least 15 minutes. Wash affected skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before re-use, and discard contaminated shoes. Get emergency medical assistance.
- Ingestion:** Call local Poison Control Center for assistance. Contact physician immediately. Aspiration Hazard - Do not induce vomiting.

VI. Safety Measures and Equipment

- Ventilation:** Adequate ventilation is required to protect personnel from exposure to chemical vapors exceeding the PEL and to minimize fire hazards. The choice of ventilation equipment, either local or general, will depend on the conditions of use, quantity of material, and other operating parameters.
- Respiratory:** Use approved respirator equipment. Follow NIOSH and equipment manufacturer's recommendations to determine appropriate equipment (air-purifying, air-supplied, or self-contained breathing apparatus).
- Eyes:** Safety glasses are considered minimum protection. Goggles or face shield may be necessary depending on quantity of material and conditions of use.
- Skin:** Protective gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements. Generally, neoprene or nitrile rubber offer acceptable chemical resistance. Individuals who are acutely and specifically sensitive to hexane may require additional protective equipment.

Storage: Hexane should be protected from temperature extremes and direct sunlight. Proper storage of hexane must be determined based on other materials stored and their hazards and potential chemical incompatibility. In general, hexane should be stored in an acceptably protected and secure flammable liquid storage room.

Other: Emergency eye wash fountains and safety showers should be available in the vicinity of any potential exposure. Ground and bond metal containers to minimize static sparks.

VII. Spill and Disposal Data

Spill Control: Protect from ignition. Wear protective clothing and use approved respirator equipment. Absorb spilled material in an absorbent recommended for solvent spills and remove to a safe location for disposal by approved methods. If released to the environment, comply with all regulatory notification requirements.

Waste Disposal: Dispose of hexane as an EPA hazardous waste. Contact state environmental agency for listing of licensed hazardous waste disposal facilities and applicable regulations. Hazardous waste number: D001(Ignitable).

VIII. SARA/Title III Data

<u>Hazard Classification</u>		<u>Chemical Listings</u>	
Immediate Health	Yes (irritant)	Extremely Hazardous Substances	No
Delayed Health	Yes	CERCLA Hazardous Substances	No
Fire	Yes	Toxic Chemicals	No
Sudden Release	No		
Reactive	No		

Hexane is not subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372. This product does not contain any other toxic chemical above 1% concentration or a carcinogen above 0.1% concentration.

Revision Date: July, 1989

KEY

ca	Approximately	STEL	Short Term Exposure Level (15 minutes)
na	Not applicable	TLV	Threshold Limit Value
C	Ceiling	TWA	Time Weighted Average (8 hours)
		BuAc	Butyl Acetate

CERCLA Comprehensive Environmental Response, Compensation and Liability Act
NSC National Safety Council ("Fundamentals of Industrial Hygiene," 3rd. Ed., 1988)

Hydrochloric Acid

CHRIS

Topic: HYDROCHLORIC ACID

VERVIEW

Material name:

HYDROCHLORIC ACID

Common synonyms:

Muriatic Acid

Characteristics:

Watery liquid Colorless Sharp, irritating odor

Sinks and mixes with water. Irritating vapor is produced.

Emergency actions:

AVOID CONTACT WITH LIQUID AND VAPOR. Keep people away.

Wear chemical protective suit with self-contained breathing apparatus.

Stop discharge if possible.

Stay upwind and use water spray to 'knock down' vapor.

Isolate and remove discharged material.

Notify local health and pollution control agencies.

Fire:

Not flammable.

Flammable gas may be produced on contact with metals.

Wear chemical protective suit with self-contained breathing apparatus.

Exposure:

CALL FOR MEDICAL AID.

VAPOR

Irritating to eyes, nose and throat.

If inhaled, will cause coughing or difficult breathing.

Move to fresh air.

If breathing has stopped, give artificial respiration.

If breathing is difficult, give oxygen.

LIQUID

Will burn skin and eyes.

Harmful if swallowed.

Remove contaminated clothing and shoes.

Flush affected areas with plenty of water.

IF IN EYES, hold eyelids open and flush with plenty of water.

IF SWALLOWED and victim is CONSCIOUS, have victim drink water

or milk.

DO NOT INDUCE VOMITING.

Water pollution:

Dangerous to aquatic life in high concentrations.

May be dangerous if it enters water intakes.

Notify local health and wildlife officials.

Notify operators of nearby water intakes.

RESPONSE TO DISCHARGE

Issue warning-corrosive Restrict access Disperse and flush

LABEL

Category: Corrosive

Class: 3

CHEMICAL DESIGNATIONS

CG compatibility class: Non-oxidizing mineral acid

Formula: HCl-H₂O

MO/UN designation: 8.0/1789

DOT id no.: 1789

Topic: HYDROCHLORIC ACID

CAS registry no.: 7647-01-0

OBSERVABLE CHARACTERISTICS

Physical state: Liquid

Color: Colorless to light yellow

Odor: Pungent; sharp, pungent, irritating

HEALTH HAZARDS

Personal protective equipment: Self-contained breathing equipment, air-line mask, or industrial canister-type gas mask; rubber or rubber-coated gloves, apron, coat, overalls, shoes.

Symptoms following exposure: Inhalation of fumes results in coughing and choking sensation, and irritation of nose and lungs. Liquid causes burns.

Treatment of exposure: INHALATION: remove person to fresh air; keep him warm and quiet and get medical attention immediately; start artificial respiration if breathing stops. INGESTION: have person drink water or milk; do NOT induce vomiting. EYES: immediately flush with plenty of water for at least 15 min. and get medical attention; continue flushing for another 15 min. if physician does not arrive promptly. SKIN: immediately flush skin while removing contaminated clothing; get medical attention promptly; use soap and wash area for at least 15 min.

Threshold limit value: 5 ppm

Short term inhalation limits: 5 ppm for 5 min.

Toxicity by ingestion: Data not available

Late toxicity: None

Vapor (gas) irritant characteristics: Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.

Liquid or solid irritant characteristics: Fairly severe skin irritant; may cause pain and second- degree burns after a few minutes' contact.

Odor threshold: 1-5 ppm

IDLH value: 100 ppm

FIRE HAZARDS

Flash point: Not flammable

Flammable limits in air: Not flammable

Fire extinguishing agents: Not pertinent

Fire extinguishing agents NOT to be used: Not pertinent

Special hazards of combustion products: Toxic and irritating vapors are generated when heated.

Behavior in fire: Not pertinent

Ignition temperature: Not flammable

Electrical hazard: Not pertinent

Burning rate: Not flammable

Adiabatic flame temperature: Data not available

Stoichiometric air to fuel ratio: Data not available

Flame temperature: Data not available

CHEMICAL REACTIVITY

Reactivity with water: No reaction

Reactivity with common materials: Corrosive to most metals with evolution of hydrogen gas, which may form explosive mixtures with air.

Stability during transport: Stable

Topic: HYDROCHLORIC ACID

Neutralizing agents for acids and caustics: Flush with water; apply powdered limestone, slaked lime, soda ash, or sodium bicarbonate.

Polymerization: Not pertinent

Inhibitor of polymerization: Not pertinent

Molar ratio (reactant to product): Data not available

Reactivity group: 1

WATER POLLUTION

Aquatic toxicity: 282 ppm/96 hr/mosquito fish/TM/fresh water 100-330 ppm/48 hr/shrimp/LC(50)/salt water

Waterfowl toxicity: Data not available

Biological oxygen demand (BOD): None

Food chain concentration potential: None

HIPPING INFORMATION

Grades of purity: Food processing or technical: 18 degrees Be-27.9%, 20 Be-31.5%, 22 degrees Be-35.2%; Reagent, ACS, and USP: 23 degrees Be-37.1%

Storage temperature: Ambient

Inert atmosphere: No requirement

Venting: Open

HAZARD CLASSIFICATIONS

Code of federal regulations: Corrosive material

HAZARD RATING FOR BULK WATER TRANSPORTATION:

Category	Rating
Fire.....	0
Health	
Vapor Irritant.....	3
Liquid or Solid Irritant.....	3
Poisons.....	2
Water Pollution	
Human Toxicity.....	2
Aquatic Toxicity.....	2
Aesthetic Effect.....	2
Reactivity	
Other Chemicals.....	3
Water.....	0
Self Reaction.....	0

FPA HAZARD CLASSIFICATION:

Category	Classification
Health Hazard (Blue).....	3
Flammability (Red).....	0
Reactivity (Yellow).....	0

PHYSICAL AND CHEMICAL PROPERTIES

Physical state at 15 degrees C. and 1 ATM: Liquid

Molecular weight: 36.46

Boiling point at 1 ATM: 123 degrees F = 50.5 degrees C = 323.8 degrees K

Freezing point: Not pertinent

Critical temperature: Not pertinent

Critical pressure: Not pertinent

Specific gravity: 1.19 at 20 degrees C (liquid)

Liquid surface tension: Not pertinent

Liquid water interfacial tension: Not pertinent

Vapor (gas) specific gravity: Not pertinent

Ratio of specific heats of vapor (gas): Not pertinent

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CHRIS

Topic: HYDROCHLORIC ACID

Latent heat of vaporization: 178 Btu/lb = 98.6 cal/g = 4.13

X 10(5) J/kg

Heat of combustion: Not pertinent

Heat of decomposition: Not pertinent

Heat of solution: -860 Btu/lb = -480 cal/g = -20 X 10(5)
J/kg

Heat of polymerization: Not pertinent

Heat of fusion: 13.0 cal/g

Limiting value: Data not available

Isobutylene

Topic: ISOBUTYLENE

- P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
3. Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing will provide limited protection. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
 4. Fire: Let tank car, tank truck or storage tank burn unless leak can be stopped; with smaller tanks or cylinders, extinguish/isolate from other flammables. Small Fires: Dry chemical, CO2 or Halon. Large Fires: Water spray or fog. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
 5. Spill or Leak: Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; isolate area until gas has dispersed. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
 6. First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of frostbite, thaw frosted parts with water. Keep victim quiet and maintain normal body temperature. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22

Flammable Properties

Fire Potential:

1. VERY DANGEROUS, WHEN EXPOSED TO HEAT OR FLAME. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial

Topic: ISOBUTYLENE

4. MASS: 26 (Atlas of Mass Spectral Data, John Wiley & Sons, New York) **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 355

Vapor Density:

1. 1.94 **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Rheinhold, 1979. 750

Vapor Pressure:

1. 3290 MM HG @ 40.5 DEG C **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 840

Other Chemical/Physical Properties:

1. REACTS EASILY WITH NUMEROUS MATERIALS, POLYMERIZES EASILY **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477
2. TASTELESS & ODORLESS /ISOBUTYLENE POLYMERS/ **PEER REVIEWED** [Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968. 34
3. MASS: 184 (Aldermaston, Eight Peak Index of Mass Spectra, UK) /Tetraisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356
4. IR: 2383 (Coblentz Society Spectral Collection) /Triisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356
5. MASS: 1114 (Atlas of Mass Spectral Data, John Wiley & Sons, New York) /Triisobutylene/ **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985.,p. V1 356

SAFETY & HANDLING

Emergency Guidelines

DOT Emergency Guidelines:

1. Fire or Explosion: Extremely flammable; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987.,p. G-22
2. Health Hazards: Vapors may cause dizziness or suffocation. Contact will cause severe frostbite. Fire may produce irritating or poisonous gases. **QC REVIEWED** [Department of Transportation. Emergency Response Guidebook 1987. DOT

Topic: ISOBUTYLENE

1. (1972) ND **PEER REVIEWED** [SRI
2. (1975) ND **PEER REVIEWED** [SRI
3. (1985) ND **QC REVIEWED**

CHEMICAL & PHYSICAL PROPERTIES

Color/Form:

1. COLORLESS LIQUID OR EASILY LIQUEFIED GAS **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Odor:

1. COAL GAS ODOR **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Boiling Point:

1. -6.9 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464.

Melting Point:

1. -140.35 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464

Molecular Weight:

1. 56.10 **PEER REVIEWED** [The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976. 674

Density/Specific Gravity:

1. 0.5942 @ 20 DEG C/4 DEG C **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464

Solubilities:

1. PRACTICALLY INSOL IN WATER; VERY SOL IN ALCOHOL, ETHER **PEER REVIEWED** [The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976. 674
2. SOL IN BENZENE, PETROLEUM ETHER, SULFURIC ACID **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464

Spectral Properties:

1. INDEX OF REFRACTION: 1.3926 @ -25 DEG C; SADTLER REF NUMBER: 7858 (IR, PRISM) **QC REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464
2. MAX ABSORPTION: 159 NM (LOG E= 3.9); 184 NM, 188 NM (LOG E= 4.1); 192 NM SHOULDER (LOG E= 3.9); 200 NM SHOULDER (LOG E= 3.9) **PEER REVIEWED** [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-464
3. IR: 8514 (Sadtler Research Laboratories IR Grating Collection) **QC REVIEWED** [Weast, R.C. and M.J. Astle. CRC Handbook of Data on Organic Compounds. Volumes I and II. Boca Raton, FL: CRC Press Inc. 1985., p. VI 355

Topic: ISOBUTYLENE

MONITORING AND ANALYSIS METHODS

Analytic Laboratory Methods:

1. SIMPLE, RAPID & SENSITIVE COLORIMETRIC METHOD WAS DEVELOPED TO DETERMINE ISOBUTYLENE IN AIR. **PEER REVIEWED** [LIPINA TG; GIG TR PROF ZABOL 17(1) 45 (1973)
2. GAS CHROMATOGRAPHY WAS USED TO STUDY DISTRIBUTION OF 6 VOLATILE HYDROCARBONS IN MOUSE & RAT BODY TISSUES. **PEER REVIEWED** [SHUGAEV BB; FARMAKOL TOKSIKOL (MOSCOW) 31(3) 360 (1968)

ADDITIONAL REFERENCES

Test Status:

1. The NTP Toxicology Research and Testing Program releases a Management Status Report on a quarterly basis. This report gives the status of chemicals studied, under study, or proposed for study by NTP. The mid-1993 issue indicates that two year study is in progress for isobutylene. Route: inhalation; Species: rats and mice. **QC REVIEWED** [NTP; Division of Toxicology Research and Testing; Management Status Report; 07/07/93; p.17

HSDB

Topic: ISOBUTYLENE

Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Storage Conditions:

1. ...MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS...SHOULD BE STORED IN A COOL, WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, AND SHOULD BE PERIODICALLY INSPECTED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

TOXICITY/BIOMEDICAL EFFECTS

Toxicity Excerpts

Human Toxicity Excerpts:

1. BUTYLENE ISOMERS ARE SIMILAR IN PHARMACOLOGICAL ACTIVITY AS ASPHYXIANTS & WEAK ANESTHETICS. ...ABOUT 4.5 TIMES AS TOXIC AS ETHYLENE. /BUTYLENE ISOMERS/ **PEER REVIEWED** [Patty, F. (ed.). Industrial Hygiene and Toxicology: Volume II: Toxicology. 2nd ed. New York: Interscience Publishers, 1963. 1204

Pharmacokinetics

Absorption, Distribution and Excretion:

1. FASTED RATS EXHALE THE HYDROCARBONS @ RATE OF APPROX 1.7 NMOL/KG/HR. THROUGH AN IMPROVED ANALYTICAL PROCEDURE OTHER VOLATILE HYDROCARBONS COULD BE DETECTED IN BREATH OF ANIMALS. **PEER REVIEWED** [FRANK H ET AL; TOXICOL APPL PHARMACOL 56(3) 337 (1980)

Interactions:

1. GAS-LIQUID CHROMATOGRAPHY WAS USED TO STUDY BRAIN HYDROCARBON CONTENT IN RATS & MICE INHALING MIXTURES OF BUTANE & ISOBUTYLENE. THERE WAS SUMMATION OF CNS DEPRESSANT EFFECTS OF BUTANE & ISOBUTYLENE TOWARD POTENTIATION RATHER THAN ANTAGONISM. **PEER REVIEWED** [SHUGAEV BB; FARMAKOL TOKSIKOL (MOSCOW); 30(1) 102 (1967)

ENVIRONMENTAL FATE/EXPOSURE POTENTIAL

Pollution Sources

Natural Occurring Sources:

1. ISOBUTYLENE IS A COMPONENT OF PETROLEUM AND NATURAL GAS **QC REVIEWED** [USITC. SYN ORG CHEM-U.S. PROD/SALES 1984

Human Exposure

Probable Exposures:

1. UNLESS ENCOUNTERED IN SUFFICIENT CONCEN TO CAUSE ASPHYXIA, THESE OLEFINS DO NOT APPEAR TO WARRANT SERIOUS CONSIDERATION FOR THEIR EFFECTS ON HEALTH OF WORKMEN EXPOSED TO LOW CONCEN FOR PROLONGED PERIODS OR TO HIGHER CONCEN FOR...SHORT PERIODS... **PEER REVIEWED** [Patty, F. (ed.). Industrial Hygiene and Toxicology: Volume II: Toxicology. 2nd ed. New York: Interscience Publishers, 1963. 1204

Topic: ISOBUTYLENE

Materials. 5th ed. New York: Van Nostrand Reinhold, 1979. 750

Flash Point:

1. -105 DEG F **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Autoignition Temperature:

1. 869 DEG F **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Fire Fighting Information

Explosive Limits and Potential:

1. EXPLOSIVE LIMITS IN AIR 1.8% TO 8.8% **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Hazardous Reactions

Reactivities and Incompatibilities:

1. CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Reinhold, 1979. 750

Preventive Measures

Protective Equipment and Clothing:

1. PROTECTIVE CLOTHING, BARRIER CREAMS...MEDICAL CONTROL... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

Other Protective Measures:

1. VENTILATION CONTROL: THE BASIC VENTILATION METHODS ARE LOCAL EXHAUST VENTILATION AND DILUTION OR GENERAL VENTILATION. **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841
2. ...SUBSTITUTION OF LESS IRRITATING SUBSTANCES...REDESIGN OF OPERATIONS...PREVENT CONTACT, PROVISION OF A PHYSICAL BARRIER AGAINST CONTACT, PROPER WASHING FACILITIES, WORK CLOTHING AND STORAGE FACILITIES... **PEER REVIEWED** [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975. 841

Other Safety & Handling

Stability/Shelf Life:

1. VOLATILE **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical Dictionary. 9th ed. New York: Van Nostrand Reinhold Co., 1977. 477

Shipment Methods and Regulations:

1. CONTAINERS: TANK CARS; CYLINDERS. ... SHIPPING REGULATIONS: (RAIL) RED GAS LABEL. (AIR) FLAMMABLE GAS LABEL. NOT ACCEPTABLE ON PASSENGER PLANES. **PEER REVIEWED** [Hawley, G.G. The Condensed Chemical

Methanol

Occupational Health Guideline for Methyl Alcohol

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: CH_3OH
- Synonyms: Methanol; wood alcohol; Columbian spirit; carbinol
- Appearance and odor: Colorless liquid with a characteristic, pungent odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for methyl alcohol is 200 parts of methyl alcohol per million parts of air (ppm) averaged over an eight-hour work shift. This may also be expressed as 260 milligrams of methyl alcohol per cubic meter of air (mg/m^3). NIOSH has recommended that the permissible exposure limit be changed to 200 ppm averaged over a work shift of up to 10 hours per day, 40 hours per week, with a ceiling of 800 ppm averaged over a 15-minute period. The NIOSH Criteria Document for Methyl Alcohol should be consulted for more detailed information.

HEALTH HAZARD INFORMATION

- Routes of exposure
Methyl alcohol can affect the body if it is swallowed, is inhaled, or comes in contact with the skin or eyes.
- Effects of overexposure
1. Short-term Exposure: Swallowing methyl alcohol or breathing very high concentrations of methyl alcohol may produce headache, weakness, drowsiness, lightheadedness, nausea, vomiting, drunkenness, and irritation of the eyes, blurred vision, blindness, and death. A

person may get better and then worse again up to 30 hours later.

- 2. Long-term Exposure:* Prolonged exposure to higher concentrations of methyl alcohol may result in headaches, burning of the eyes, dizziness, sleep problems, digestive disturbances, and failure of vision. Repeated or prolonged skin exposure may cause skin irritation.
- 3. Reporting Signs and Symptoms:* A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to methyl alcohol.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to methyl alcohol at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the employee at increased risk, and to establish a baseline for future health monitoring. Examination of the skin, liver, kidneys, and eyes should be stressed.

—Skin disease: Methyl alcohol is a defatting agent and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be susceptible to the effects of this agent.

—Liver function tests: Methyl alcohol may cause liver damage. A profile of liver function should be obtained by utilizing a medically acceptable array of biochemical tests.

—Kidney disease: Although methyl alcohol has not been proven to be kidney toxin in humans, the importance of this organ in the elimination of toxic substances justifies special consideration in those with impaired renal function.

—Eye disease: Because methyl alcohol may cause optic atrophy and blindness, those with pre-existing eye diseases may be at increased risk from exposure.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis. In addition, anyone developing the above-listed conditions or who has been splashed in the eyes with

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

processes of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with liquid methyl alcohol.

- Clothing wet with liquid methyl alcohol should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of methyl alcohol from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the methyl alcohol, the person performing the operation should be informed of methyl alcohol's hazardous properties.

- Any clothing which becomes wet with liquid methyl alcohol should be removed immediately and not reworn until the methyl alcohol is removed from the clothing.

- Employees should be provided with and required to use splash-proof safety goggles where liquid methyl alcohol may contact the eyes.

SANITATION

- Skin that becomes wet with liquid methyl alcohol should be promptly washed or showered to remove any methyl alcohol.

- Eating and smoking should not be permitted in areas where liquid methyl alcohol is handled, processed, or stored.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to methyl alcohol may occur and control methods which may be effective in each case:

Operation	Controls	
Liberation during application of surface coatings such as shellac, wood dyes, nitrocellulose lacquers, water-proofing formulations, and phenolic resins	Local exhaust ventilation; general dilution ventilation; personal protective equipment	—
Use as a solvent for rotogravure inks, aniline dyes, and duplicator fluids	General dilution ventilation	—
Liberation during manual application of methanol as a cleaner for coated surfaces, leather, gloves, and metal and resins surfaces prior to further treatment	General dilution ventilation; personal protective equipment	—
Liberation during manufacture of formaldehyde by oxidation or dehydrogenation	Local exhaust ventilation; general dilution ventilation	—
Use in plastics industry to produce plasticizers, softening agents, and acrylic resins	Local exhaust ventilation; general dilution ventilation; personal protective equipment	—
Liberation during use as an intermediate in the preparation of methacrylates, methyl chlorides, methyl ethers, dimethyl sulfate, methyl formate, and methyl bromide	Local exhaust ventilation; general dilution ventilation; personal protective equipment	—
Liberation during application as an extractant in industrial chemical processes such as refinery gasoline and oils and purifying pharmaceuticals such as steroids and hormones	Local exhaust ventilation; general dilution ventilation	—
Use as a solvent in rubber industry	Local exhaust ventilation; general dilution ventilation; personal protective equipment	—

Baxter Healthcare Corporation
Burdick & Jackson Division
1953 South Harvey Street
Muskegon, MI 49442 USA

information/emergency telephone no. 616.726.3171
chemtrec telephone no. 800.424.9300
canadian emergency telephone no. 613.996.6666

MATERIAL SAFETY DATA SHEET

METHANOL

I. Identification

chemical name Methanol molecular weight 32.04
chemical family Alcohol formula CH₄O
synonyms Carbinol, Methyl Alcohol, Wood Alcohol
DOT proper shipping name Methyl Alcohol or Methanol
DOT hazard class Flammable Liquid
DOT identification no. UN1230 CAS no. 67-56-1

II. Physical and Chemical Data

boiling point, 760mm Hg. 64.7°C freezing point -97.7°C evaporation rate (BuAc=1) ca 5
vapor pressure at 20°C 97 mm Hg vapor density (air=1) 1.11 solubility in water @ 20°C complete
% volatiles by volume ca 100 specific gravity (H₂O=1) @ 20°C 0.792 stability Stable
hazardous polymerization Not expected to occur.
appearance and odor A clear, colorless liquid with a slight alcoholic odor.
conditions to avoid Heat, sparks, open flame, open containers, and poor ventilation.

materials to avoid Strong oxidizing agents and reactive metals which will displace hydrogen.

hazardous decomposition products Incomplete combustion can generate carbon monoxide and other toxic vapors such as formaldehyde.

III. Fire and Explosion Hazard Data

flash point, (test method) 12°C (Tag closed cup) auto ignition temperature 385°C
flammable limits in air % by volume: lower limit 6.7 upper limit 36.5
unusual fire and explosion hazards May burn with an invisible flame. Mixtures with water as low as 21% by volume are still flammable (flash point below 37.8°C). Under some circumstances can corrode certain metals, including aluminum and zinc, and generate hydrogen gas.
extinguishing media Carbon dioxide, dry chemical, alcohol foam, water mist or fog.
special fire fighting procedures Wear full protective clothing and self-contained breathing apparatus. Heat will build pressure and may rupture closed storage containers. Keep fire-exposed containers cool with water spray.

IV. Hazardous Components

Methanol % ca 100 TLV 200 ppm (skin) CAS no. 67-56-1

Burdick & Jackson's Disclaimer: The information and recommendations presented in this Material Safety Data Sheet are based on sources believed to be reliable on the date hereof. Burdick & Jackson makes no representation on its completeness or accuracy. It is the user's responsibility to determine the product's suitability for its intended use, the product's safe use, and the product's proper disposal. No representations or warranties, either express or implied, of merchantability or fitness for a particular purpose or of any other nature are made with respect to the information provided in this Material Safety Data Sheet or to the product to which such information refers. Burdick & Jackson neither assumes nor authorizes any other person to assume for it, any other or additional liability or responsibility resulting from the use of, or reliance upon, this information.

Emergency First Aid:

- Inhalation:** Immediately remove to fresh air. If not breathing, administer mouth-to-mouth rescue breathing. If there is no pulse administer cardiopulmonary resuscitation (CPR). Contact physician immediately.
- Eye Contact:** Rinse with copious amounts of water for at least 15 minutes. Get emergency medical assistance.
- Skin Contact:** Flush thoroughly for at least 15 minutes. Wash affected skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before re-use, and discard contaminated shoes. Get emergency medical assistance.
- Ingestion:** Call local Poison Control Center for assistance. Contact physician immediately. Never induce vomiting or give anything by mouth to a victim unconscious or having convulsions.

Note to Physician

In case of ingestion or massive inhalation, observe victim as an inpatient because slow metabolism causes a latent period of 24 hours between exposure and acidosis and blindness.

VI. Safety Measures and Equipment

- Ventilation:** Adequate ventilation is required to protect personnel from exposure to chemical vapors exceeding the PEL and to minimize fire hazards. The choice of ventilation equipment, either local or general, will depend on the conditions of use, quantity of material, and other operating parameters.
- Respiratory:** Use approved respirator equipment. Follow NIOSH and equipment manufacturer's recommendations to determine appropriate equipment (air-purifying, air-supplied, or self-contained breathing apparatus).
- Eyes:** Safety glasses are considered minimum protection. Goggles or face shield may be necessary depending on quantity of material and conditions of use.
- Skin:** Protective gloves and clothing are recommended. The choice of material must be based on chemical resistance and other user requirements. Generally, neoprene, nitrile rubber, or rubber offer acceptable chemical resistance. Individuals who are acutely and specifically sensitive to methanol may require additional protective equipment.

RESPIRATORY PROTECTION FOR METHYL ALCOHOL

Condition	Minimum Respiratory Protection* Required Above 200 ppm	382 129
Vapor Concentration		
2000 ppm or less	Any supplied-air respirator. Any self-contained breathing apparatus.	
10,000 ppm or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.	
25,000 ppm or less	A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.	
Greater than 25,000 ppm or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.	
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.	
Escape	Any escape self-contained breathing apparatus.	

*Only NIOSH-approved or MSHA-approved equipment should be used.

Nitric Acid

 T R A D E N A M E S

Canadian Centre for Occupational Health and Safety

*** IDENTIFICATION ***

RECORD NUMBER : 240411
 LANGUAGE : ENGLISH
 TRADE NAME(S) : NITRIC ACID
 PRODUCT IDENTIFICATION DATA : J.T. BAKER MSDS NUMBER: N3660 PRODUCT CODES:
 9597,6901,9602,9616,9605,5113,5371,4801,9604,960
 1,9600,9606 9598
 DATE OF MSDS : 1989-05-01

*** MANUFACTURER INFORMATION ***

MANUFACTURER : J T BAKER CHEMICAL CO
 ADDRESS : 222 RED SCHOOL LANE
 PHILLIPSBURG NEW JERSEY
 U.S.A. 08865
 EMERGENCY TELEPHONE NO.(S) : 201-859-2151
 800-424-9300 (CHEMTREC)
 800-424-8802 (NATIONAL RESPONSE CENTER)

*** MATERIAL SAFETY DATA ***

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
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NITRIC ACID

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 ISSUED: 07/21/90

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: NITRIC ACID
 COMMON SYNONYMS: HYDROGEN NITRATE; AZOTIC ACID
 CHEMICAL FAMILY: INORGANIC ACIDS
 FORMULA: HNO3
 FORMULA WT.: 63.01
 CAS NO.: 7697-37-2
 NIOSH/RTECS NO.: Q05775000
 PRODUCT USE: LABORATORY REAGENT
 PRODUCT CODES: 9597,6901,9602,9616,9605,5113,5371,4801,9604,9601,9600,9606
 9598

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (OXIDIZER)
CONTACT	-	4	EXTREME (CORROSIVE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

POISON DANGER

SPILLAGE MAY CAUSE FIRE OR LIBERATE DANGEROUS GAS. HARMFUL IF INHALED AND MAY CAUSE DELAYED LUNG INJURY. STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. LIQUID AND VAPOR CAUSE SEVERE BURNS. MAY BE FATAL IF SWALLOWED OR INHALED.

KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT STORE NEAR COMBUSTIBLE MATERIALS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE WATER SPRAY. IN CASE OF SPILL, NEUTRALIZE WITH SODA ASH OR LIME.

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PRECAUTIONARY LABELING (CONTINUED)

INTERNATIONAL LABELING

CAUSES SEVERE BURNS.

KEEP OUT OF REACH OF CHILDREN. DO NOT BREATHE VAPOUR. IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE. TAKE OFF IMMEDIATELY ALL CONTAMINATED CLOTHING.

SAF-T-DATA* STORAGE COLOR CODE: YELLOW (REACTIVE)

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
NITRIC ACID	7697-37-2	65-71	2 PPM	2 PPM
WATER	7732-18-5	29-35	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: 121 C (249 F)
(AT 760 MM HG)

VAPOR PRESSURE (MMHG): 9
(20 C)

MELTING POINT: -42 C (-43 F)
(AT 760 MM HG)

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: 1.41
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: 100
(21 C)

PH: 1.0 (0.1M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. SUFFOCATING ODOR.

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SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

NFPA 704M RATING: 3-0-0 OXY

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A

LOWER - N/A

FIRE EXTINGUISHING MEDIA

USE WATER SPRAY.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE EXPOSED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL; DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR. A VIOLENT EXOTHERMIC REACTION OCCURS WITH WATER. SUFFICIENT HEAT MAY BE PRODUCED TO IGNITE COMBUSTIBLE MATERIALS.

TOXIC GASES PRODUCED

OXIDES OF NITROGEN, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT

NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE

NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 (2 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 10 MG/M3 (4 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 (2 PPM)

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SECTION V - HEALTH HAZARD DATA (CONTINUED)

TOXICITY OF COMPONENTS

INHALATION-1HR RAT LC50 FOR NITRIC ACID
INTRAPERITONEAL MOUSE LD50 FOR WATER
INTRAVENOUS MOUSE LD50 FOR WATER

2500 PPM
190 G/KG
25 G/KG

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER: REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

J. T. BAKER NEUTRASORB(R) OR TEAM(R) 'LOW NA-' ACID NEUTRALIZERS ARE FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001, D002 (IGNITABLE, CORROSIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA® STORAGE COLOR CODE: YELLOW (REACTIVE)

STORAGE REQUIREMENTS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS. ISOLATE FROM INCOMPATIBLE MATERIALS. KEEP PRODUCT OUT OF LIGHT.

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INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: YES PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE: YES CONTAINS NITRIC ACID (RQ = 1,000 LBS, TPQ = 1,000 LBS)

CERCLA HAZARDOUS SUBSTANCE: YES CONTAINS NITRIC ACID (RQ = 1000 LBS)

SARA 313 TOXIC CHEMICALS: YES CONTAINS NITRIC ACID

GENERIC CLASS: C16

TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, LIGHT, MOISTURE

INCOMPATIBLES: STRONG BASES, CARBONATES, SULFIDES, CYANIDES, COMBUSTIBLE MATERIALS, ORGANIC MATERIALS, STRONG REDUCING AGENTS, MOST COMMON METALS, POWDERED METALS, CARBIDES, AMMONIUM HYDROXIDE, WATER, ALCOHOLS

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN, HYDROGEN

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SECTION VII - SPILL & DISPOSAL PROCEDURES

CARCINOGENICITY: NTP: NO IARC: NO LIST: NO OSHA REG: NO

CARCINOGENICITY

NONE IDENTIFIED.

REPRODUCTIVE EFFECTS

NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: SEVERE IRRITATION OR BURNS OF RESPIRATORY SYSTEM, COUGHING, DIFFICULT BREATHING, CHEST PAINS, PULMONARY EDEMA, LONG INFLAMMATION, UNCONSCIOUSNESS, AND MAY BE FATAL

SKIN CONTACT: SEVERE IRRITATION OR BURNS

EYE CONTACT: SEVERE IRRITATION OR BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NAUSEA, VOMITING, SEVERE BURNS, ULCERATION - MOUTH, THROAT, STOMACH, AND MAY BE FATAL

CHRONIC EFFECTS: DAMAGE TO LUNGS, TEETH

TARGET ORGANS

EYES, SKIN, MUCOUS MEMBRANES, RESPIRATORY SYSTEM, LUNGS, TEETH, GI TRACT

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

DAMAGED SKIN, EYE DISORDERS, CARDIOPULMONARY DISEASE, LONG DISEASE

PRIMARY ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

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SECTION V - HEALTH HAZARD DATA (CONTINUED)

EMERGENCY AND FIRST AID PROCEDURES

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: NITRIC ACID (OVER 40%)
HAZARD CLASS: OXIDIZER
UN/NA: UN2031 REPORTABLE QUANTITY: 1000 LBS.
LABELS: OXIDIZER, CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.268

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8
UN: UN2031 MARINE POLLUTANTS: NO
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

I.M.O. PAGE: 8185
PACKAGING GROUP: II

AIR (I.C.A.O.)

PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8
UN: UN2031
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

PACKAGING GROUP: II

U.S. CUSTOMS HARMONIZATION NUMBER: 28080000000

N/A = NOT APPLICABLE OR NOT AVAILABLE

N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.

EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES

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ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL. BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.

THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

Sulfuric Acid

5.1.28

2002 1111
NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: SULFURIC ACID

1.0. IDENTIFIERS

CAS Number: 7664-93-9

DOT Number: UN 1830

RTK Substance number: 1761

Date: January 1986

2.0 HAZARD SUMMARY

- * Sulfuric Acid can affect you when breathed in.
- * Sulfuric Acid is a CORROSIVE CHEMICAL and can severely burn the skin and eyes. It can cause third-degree skin burns and blindness on contact.
- * Exposure to mist can irritate the eyes, nose, throat, and lungs, causing coughing, chest tightness and sneezing. Higher levels can cause a build-up of fluid in the lungs, (pulmonary edema) which can be fatal.
- * Repeated exposures can cause permanent lung damage and damage teeth.
- * Sulfuric Acid is a REACTIVE CHEMICAL and is an EXPLOSION HAZARD.

IDENTIFICATION

Sulfuric Acid is an oily liquid. It is used in fertilizers, chemicals, dyes, petroleum refining, etching, analytical chemistry and in making iron, steel and industrial explosives.

REASON FOR CITATION

- * Sulfuric Acid is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT and NIOSH and EPA.
- * This chemical is also on the Special Health Hazard Substance List because it is REACTIVE and CORROSIVE.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 mg/m³ averaged over an 8-hour workshift.

NEW JERSEY HAZARDOUS SUBSTANCE FACT SHEETS

Topic: SULFURIC ACID

NIOSH: The recommended airborne exposure limit is 1 mg/m³ averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 1 mg/m³ averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Sulfuric Acid and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Sulfuric Acid to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

3.0 HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Sulfuric Acid:

- * Contact can severely burn the skin and eyes causing permanent damage.
- * Exposure to Sulfuric Acid mist or fumes can irritate the eyes, causing tearing; the nose and throat causing sneezing; and can irritate the lungs causing chest tightness, coughing and shortness of breath.
- * High levels can burn the lungs and cause a build-up of fluid (pulmonary edema). This can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Sulfuric Acid and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Sulfuric Acid has not been tested for its ability to cause cancer in animals.

APPENDIX H
Equipment Decontamination Procedures

APPENDIX H

EQUIPMENT DECONTAMINATION PROCEDURES

The following procedures will be used to decontaminate soil and groundwater sampling equipment to prevent cross contamination of samples. The following procedures meet applicable EPA protocols for sampling equipment decontamination.

I. FIELD SETUP

To prevent cross contamination from decontamination washing and rinsing overspray during the procedure, the following field setup protocol will be followed.

- One 5-foot folding table, covered in sheet plastic draping down onto the ground to provide a walking area will be used for washing and rinsing activities.
- One 5-foot folding table, covered in sheet plastic draping down onto the ground to provide a walking area will be used for air drying and temporary storage activities.
- A plastic tub can be used for non-phosphate detergent washes.
- Stiff long-handled nonmetallic bristle scrub brushes will be used.
- Stainless steel pans with perforated trays will be used for tap water draining, methanol and hexane rinsing, and American Society for Testing and Materials (ASTM) Type II water rinsing (one each - three total), and will be used exclusively for each activity.
- Small laboratory rinse bottles will be used for pesticide grade solvent rinsing.
- Stainless steel sprayers (up to 5 gallon capacity) will be used for tap water and ASTM Type II water rinsing, and will be used exclusively for each activity.
- Potable water (tap water) must come from a single source and must be subjected to periodic QC analysis; the single source location for the potable water will be from the location directed by the site manager or designee.

II. SAMPLING EQUIPMENT - METAL

All metal sampling equipment, including stainless steel bailers, split-spoon samplers, sample sleeves, hand augers and sample cutting knives used to collect samples for organics

or metals analysis will be decontaminated according to the following procedure before each sample is taken.

1. Knock off or prescrub with tap water in a plastic tub.
2. Discard prescrub tap water and replace with clean tap water when it becomes visibly dirty and discolored.
3. Scrub clean with a stiff, long-handled, nonmetallic scrub brush and a non-phosphate detergent and tap water solution (Liquinox or equivalent) in a plastic tub.
4. Replace the non-phosphate detergent and tap water solution when it becomes visibly dirty and discolored.
5. Rinse with tap water.
6. Rinse with ASTM Type II water.
7. Rinse with methanol (methyl alcohol, pesticide grade or equivalent).
8. Rinse with pesticide grade hexane.

Place clean sampling equipment in a clean area on the drying table and allow it to air dry. If the decontaminated sampling equipment will not be used immediately, place it in suitably sized plastic bags. Seal with a signed, dated custody seal. Label the plastic bags "clean" and store in a contaminant-free environment.

III. SAMPLING EQUIPMENT - TEFLON AND OTHER PLASTICS

Teflon bailers or any other plastic equipment used to collect samples for organics or metals analysis will be decontaminated as follows.

1. Scrub with a non-phosphate detergent and tap water solution (Liquinox or equivalent) in a plastic tub.
2. Replace the non-phosphate detergent and tap water solution when it becomes dirty and discolored.
3. Rinse with tap water.
4. Rinse with ASTM Type II water.
5. Rinse with methanol (methyl alcohol, pesticide grade or equivalent).

6. Rinse with pesticide grade hexane.

Place clean sampling equipment in a clean area on the drying table and allow it to air dry. If the decontaminated sampling equipment will not be used immediately, place it in suitably sized plastic bags. Seal with a signed, dated custody seal. Label the plastic bags "clean" and store in a contaminant-free environment.

IV. DOCUMENTATION

The following information (at a minimum) must be logged into a field notebook to demonstrate that the decontamination procedure was performed properly.

1. Date
2. Site Location
3. Decontamination procedures and solutions used
4. Type of equipment decontaminated (manufacturer's name, model, and serial number as applicable)
5. Special or unusual conditions or problems (e.g., wind, ambient air conditions, etc)
6. Storage location for clean equipment not immediately used.

V. SAFETY CONSIDERATIONS

1. Proper precautions must be taken when using solvents. Refer to the applicable site safety and health procedure before using. Make sure the correct personal protective equipment is available, and is used when handling solvents.
2. Decontaminate equipment and clean up the site in accordance with approved project procedures.
3. Dispose of the waste waters, solvents, and PPE in accordance with approved project waste management procedures when sampling and decontamination are complete.

APPENDIX I
Health and Safety Forms

HEALTH & SAFETY EXPOSURE MONITORING

PROJECT #: _____
PROJECT LOCATION: _____
PROJECT ACTIVITY: _____

DATE: _____
LOCATION MONITORED: _____
ACTIVITY MONITORED: _____

DRILL RIG TYPE/NO _____
PERSONNEL AT THIS LOCATION _____
PERSONNEL AFFECTED BY H2S MONITORING: _____

[illegible]

INSTRUMENT	MF OR V	SERIAL #	CALIBRATION STANDARD		INITIAL	END OF DAY
	MODEL #		CAL GAS	STD (ppm)	CALIBRATION CHECK	CALIBRATION CHECK
FID	_____	_____	_____	_____	_____	_____
PID	_____	_____	_____	_____	_____	_____
%O2	_____	_____	_____	_____	_____	_____
%UEL	_____	_____	_____	_____	_____	_____
H2S	_____	_____	_____	_____	_____	_____
RAM	_____	_____	_____	_____	_____	_____

FIELD TEAM LEADER SIGNATURE _____

**EMPLOYEE PHYSIOLOGICAL
MONITORING RECORD FOR HEAT STRESS**

Employee Name: _____
Division: _____
Date: _____
Start Time: _____
Health & Safety Officer: _____

Employee SSN: _____
Location: _____
Job Number: _____
Stop Time: _____
Supervisor: _____

TEMPERATURES

A. INITIAL READING

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

B. AFTER FIRST WORK PERIOD

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

C. AFTER SECOND WORK PERIOD

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

D. AFTER THIRD WORK PERIOD

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

E. AFTER FOURTH WORK PERIOD

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

F. AFTER FIFTH WORK PERIOD

1. Ambient Air Temperature _____
2. Baseline Oral Temperature _____
3. WBGT _____

HEART RATE

A. INITIAL READING

1. Baseline Heart Rate _____ B/min

B. AFTER FIRST WORK PERIOD

1. Baseline Heart Rate _____ B/min

C. AFTER SECOND WORK PERIOD

1. Baseline Heart Rate _____ B/min

D. AFTER THIRD WORK PERIOD

1. Baseline Heart Rate _____ B/min

E. AFTER FOURTH WORK PERIOD

1. Baseline Heart Rate _____ B/min

F. AFTER FIFTH WORK PERIOD

1. Baseline Heart Rate _____ B/min

AIR MONITORING RECORD

Employee Name _____

Company Name _____

Social Security No. _____

Date Sampled _____

Employee No. _____

Shift _____

Job Title _____

Sampled By _____

Calibration Data _____

Date of Calibration _____

Instrument Serial No. _____

Flow Rate _____

Model No. _____

Method _____

Sample Type/Analyte

Collection Media

Description of Collector - Mfg., Lot #, Type of Filter, etc.

☐ Personal - TWA
☐ Personal - Peak
☐ Area
☐ Blank
☐ Bulk
☐ Lab Control
☐ Source

☐ Charcoal Tube
☐ Filter (Resp.)
☐ Filter (Total)
☐ Impinger
☐ Passive Dosimeter
☐ Silica Gel
☐ Chromosorb

Length of Time on this Job _____

Does Sample Represent Typical Exposure? _____

Describe any personal protection used or the type of operation (if area monitoring only)

Sampling Data _____ Temp _____ Barometer _____ Humidity _____ Wind _____

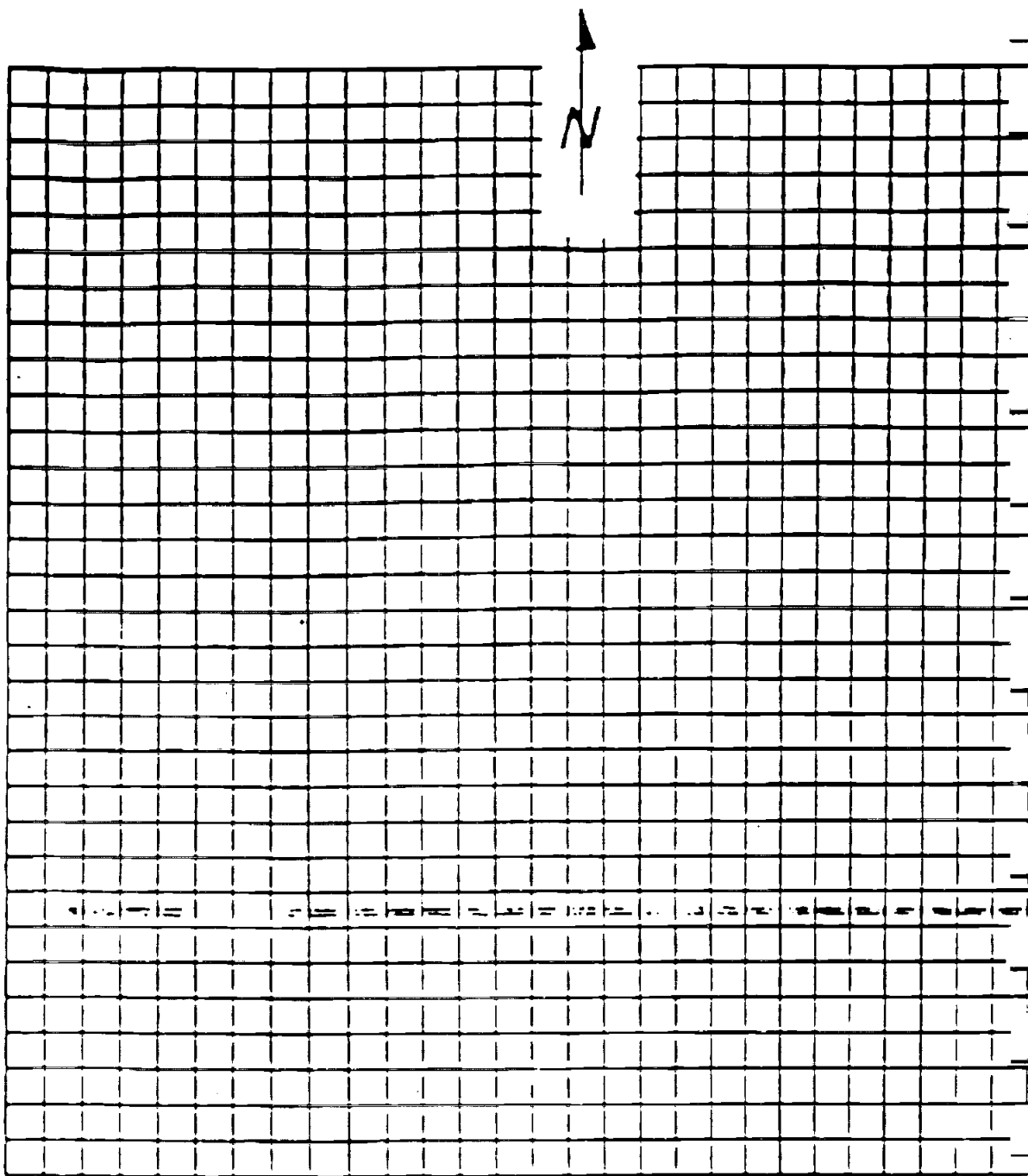
EQUIP- MENT NO.	SAMPLE NO.	TIME ON	TIME OFF	TOTAL TIME	FLOW SAMPLE VOLUME	ANALYTICAL RESULT	TWA

DESCRIPTIVE DATA: Work task, unusual events, engineering controls, sample interferences, etc.

Date: _____ Signature: _____

302.

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WEATHER:

WIND SPEED:

TEMPERATURE:

WIND DIRECTION:

APPENDIX J
Accident Investigation and Notification

DRAFT

ACCIDENT INVESTIGATION AND NOTIFICATION

1.0 OBJECTIVE

1.1 This Standard Operating Procedure provides the following:

1.1.1 Effective investigation and analysis of accidents/post-accident procedures

1.1.2 Reporting and recording procedures for accidents, injuries, and hazardous chemical releases and exposures

1.1.3 Applicable site postings

1.1.4 Accident response procedures

2.0 APPLICABILITY

2.1 This procedure applies to all employees covered by the Jacobs Environmental Health and Safety Program. The information herein will be included in the Emergency Preparedness Section of site health and safety plans.

2.2 This SOP shall apply to near miss incidents that can be considered as having the potential for significant injury and/or property loss.

3.0 SCOPE

3.1 The scope of this SOP is intended to cover accident investigation and notification of all accidents and/or incidents including "near misses." This SOP further covers procedure, reporting, and record keeping requirements for personal injury, illness, and exposure. Also covered are any accidental releases of hazardous chemicals and/or property damage occurring as a consequence of site activity.

4.0 PROGRAM ADMINISTRATION DEFINITIONS

4.1 The *Corporate Health and Safety Manager* (CHSM) is responsible for reviewing all occupationally-related injuries, illnesses, and exposures, including First Aid only and OSHA reportable incidents, and hazardous chemical releases. The CHSM is also responsible for taking necessary corrective action based on submitted reports and notifications.

4.2 The *Corporate Health and Safety Administrator* (CHSA) is responsible for maintenance for all corporate health and safety files and collecting all occupationally-related injury, illness, exposure, and hazardous chemical release information.

- 4.3 The *Site Manager* (SM) is responsible for conducting investigations of accidents/incidents and "near misses." After identification of problems, corrective actions will be instituted. All findings and corrective actions will be documented on the Site Manager's Investigation Report.
- 4.3.1 The SM is also responsible for coordinating with the Corporate Health & Safety Office, local Jacobs Human Resources Department, and Regional Safety Department to insure completion, filing, and posting of all OSHA forms 200 and 101 for reportable site injuries, illnesses, and exposures.
- 4.3.2 The SM shall notify the CHSM and Regional or Regional Safety Department Representative of all occupationally-related injuries, illnesses, and exposures, including First Aid only and OSHA reportable incidents, and hazardous chemical releases.
- 4.4 The *Site Health and Safety Officer* (SHSO) is responsible for assisting the SM in the above listed responsibilities.
- 4.4.1 If a SHSO is not appointed, a designated personnel may be delegated to assist the Site Manager in the reporting and record keeping responsibilities.
- 4.5 The *Local Human Resources Representative* (LHRR) is responsible for: processing workmans' compensation claims and coordinating approved company doctor, hospital, or clinic for office injuries/exposures. The LHRR is also responsible for following Jacobs Safety Department *and* Corporate Health and Safety Department procedures for office injuries and exposures. In addition, the LHRR shall complete, file, and post OSHA Forms 200 and 101 for reportable office injuries and exposures. This includes injuries while traveling for business.
- 4.6 The *Regional Safety Department Representative* (RSDR) is responsible for administering the Jacobs Safety Program. Therefore, reporting procedures include notifying the primary contacts designated in attachment A.

5.0 PROCEDURE - GENERAL

- 5.1 The following information will be obtained as appropriate:

- 5.1.1 *Approved Company Doctor, Clinic, or Hospital*
Prior to initiation of any onsite activities requiring health and safety plans, the SHSO will contact the Coordinator in the Corporate Risk Management Department in Pasadena at (818) 578-6886 to obtain a list of approved medical facilities for the site location.

6.0 PROCEDURE - ACCIDENT RESPONSE

6.1 Injured/ill employees shall be taken to approved facilities. To obtain a list of approved doctors, clinics, or hospital, see 5.1.1.

6.1.1 An Authorization for Medical Treatment Form (attachment B) is to accompany each injured/ill employee. The top portion of the form is to be completed by job site personnel and the attending physician is to complete the bottom portion. The completed form must be forwarded to the appropriate regional contact (See attachment A) within 48 hours of each visit. A Workers' Compensation Form (completed by LHRR) may also be required.

7.0 PROCEDURE - POST-ACCIDENT

7.1 After the employee has received treatment, the Site Health and Safety Officer will arrange for a post-accident drug screen for all injured employees immediately following an accident. Hepatitis B vaccine may need to be offered to employees who were exposed to blood during responding to an incident. Review SOP 7.6 Bloodborne Pathogens.

7.2 Initial accident investigation shall begin at the discretion of the Site Health and Safety Officer and/or the Site Manager. At a minimum, the scene shall be secured (no movement of material or equipment shall be made until a review of the accident is completed) and signed statements from witnesses shall be obtained.

8.0 REPORTING

All occupationally-related injuries, illnesses, accidents, exposures, hazardous chemical releases, and property damage will be appropriately reported. Completion of this activity is imperative to detecting trends and establishing actions to prevent recurrence.

8.1 A verbal report must be made to the CHSM *and* RSDR as soon as possible for all occupationally-related injuries (including First Aid only incidents,) illnesses, exposures, and hazardous chemical releases.

8.2 Serious or fatal injuries are to be reported *immediately* to the CHSM, the RSDR, the appropriate Operations Manager, and the appropriate Group Vice President.

8.3 The following must be reported to the CHSM, RSDR, and the appropriate Operations Manager with the appropriate form(s) (See Section 9.0 Record Keeping): All job related injuries and illnesses requiring a doctors visit, all exposures, and hazardous material releases in potentially reportable quantities (by EPA-RCRA definitions.)

8.4 The following information must be made available:

8.4.1 Name, social security number, office location, job title

8.4.2 Date and location of accident or incident

8.4.3 Description of the event/and injury - (extent)

8.4.4 Potential for lost time

8.4.5 What medical facility was used and when

8.4.6 Who rendered First Aid/CPR

8.5 The Corporate Risk Management Department in Pasadena will be contacted to report all property damage. (See attachment A)

8.6 The Project Manager will contact the client

9.0 RECORD KEEPING

All occupationally-related injuries, illnesses, accidents, and hazardous chemical release (exposure) incidents will be appropriately recorded. The following reports will be made and submitted:

9.1 Site Managers Investigation Report (See attachment F)

To be completed by the first line Site Manager as soon as possible following the incident. Return completed form to the RSDR. A copy *must* also be sent to the CHSM.

9.2 Witness Statement (See attachment G)

To be used to obtain a signed statement from witnesses of their complete (factual) observations. Names and permanent addresses shall be secured for future reference. Return to the RSDR. A copy *must* also be sent to the CHSM.

9.3 Employee's Report of Occupational Injury or Disease (See attachment H)

This form is state specific. This form must be completed for all injuries, illnesses, and exposures requiring a doctor's visit. The location code (project number) will be used as the form of identification. Return this form to the RSDR within 24 hours of initial doctor's visit. A copy *must* also be sent to the CHSM.

9.4 Employee Exposure/Hazardous Chemical Release Report Form 9-1 (See attachment C)

9.4.1 All incidents involving exposure to potentially hazardous materials while working, including incidents onsite, in the office, during company travel, and hazardous material releases in potentially reportable quantities (by EPA-RCRA definitions) must be reported to CHSM. Document the incident on Employee Exposure/Hazardous Chemical Release Report, Form 9-1.

9.4.1.1 Further notification procedures i.e., agency notifications, shall be followed as outlined in the site specific health and safety plan.

9.4.2 The SM shall complete and return Form 9-1 to the CHSM as soon as possible. A copy of this form *must* also be sent to the RSDR. This form is to be completed for all hazardous chemical exposure and release incidents *only*.

9.4.3 It is important to report all exposures even though the incident is not considered serious or no adverse health effects or symptoms are apparent at the time.

9.4.4 The employee must be given a copy of the report. Additional copies must be placed in the employee's corporate health and safety medical file and exposure file.

9.5 First Aid Register (See attachment E)
This is the primary project injury log. All injuries/illness, treated or reported (actual or alleged), shall be entered into the log. This register is to be used no matter how minor the event may be. *There are no exceptions to this reporting requirement.* The register is kept at the project site.

9.6 Vehicle Accident Reporting Procedure (See attachment I)
For any vehicle accident or injuries involving a vehicle, please follow and complete necessary forms dictated by the Vehicle Accident Reporting Procedures.

10.0 OSHA REPORTING/RECORD KEEPING PROCEDURES

10.1 Preparation and Maintenance of records relating to occupational injuries, illnesses, and exposures required by OSHA will be maintained by:

Office-related This includes injuries or accidents while on company-related travel.

LHRR

Project Site-related

SHSO or designated personnel

10.2 Log and Summary of Occupational Injuries and Illnesses Form - OSHA Form 200 (See attachment D)

10.2.1 All occupational injuries and illnesses that require treatment other than First Aid are reported on OSHA Form 200 - Log and Summary of Occupational Injuries and Illnesses. Information for each "recordable case" of occupational injury or illness shall be entered on the form within six (6) work days after learning of its occurrence.

10.2.1.1 A "recordable case" is defined on the front of OSHA Form 200 as "...every occupational death, every nonfatal occupational illness, and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid)..." Further definitions and instructions are provided on the back of the form.

10.2.1.2 OSHA's record keeping and reporting requirements differ from those under the various State Workers' Compensation laws. Because they differ, employers must not substitute Workers' Compensation criteria for determining whether or not a case should be recorded for OSHA.

10.2.2 All entries on OSHA Form 200 must be identified by a case or file number. Entry numbers must be non-duplicating to facilitate comparison with OSHA Form 101, Supplementary Record of Occupational Injuries and Illnesses (described in section 10.3).

10.2.3 One OSHA Form 200 is used at the project site or office location per year. Each incident is added to the same form on a separate line.

10.2.4 A copy of OSHA Form 200 with injury/illness information recorded shall be sent to the CHSM and RSDR within 45 calendar days of its recording.

10.2.5 At the beginning of each calendar year, a summary of all injuries and illnesses recorded on OSHA Form 200 for the preceding year must be made. Instructions on the back of Form 200 describe how the summary is compiled. Even if

there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.

10.2.5.1 The OSHA 200 Form must be posted with summary information for the preceding year where notices to employees are commonly posted *no later than February 1 and must remain in place until March 1.*

10.2.5.2 A copy of the summary OSHA Form 200 *must* be sent to the CHSA and RSDR at year end no later than January 15.

10.3 Supplementary Record of Occupational Injuries and Illness - OSHA Form 101. (See attachment K)

10.3.1 To supplement the Log and Summary of Occupational Injuries and Illnesses - OSHA Form 200, each establishment must maintain a record of each recordable occupational injury or illness. If no suitable report is made for other purposes, the Supplementary Record OSHA No. 101 may be used.

10.3.1 Or, the record may consist of the one or more of the documents listed below.

10.3.1.1 Workers' Compensation, insurance, or other reports are also acceptable as records if they contain all facts listed below or are supplemented to do so.

10.3.1.2 The record may also be listed on a plain sheet of paper containing the following facts. For further information, please see Definitions on the back of OSHA Form 200:

- 1) *About the employer*-name, mail address, and location if different from mail address.
- 2) *About the injured or ill employee*-name, social security number, home address, age, sex, occupation, and department.
- 3) *About the accident or exposure to occupational illness*-place of accident or exposure, whether it was on employer's premises, what the employee was doing

when injured, and how the accident occurred.

- 4) *About the occupational injury or illness-* description of the injury or illness, including part of body affected, name of the object or substance which directly injured the employee, and date of injury or diagnosis of illness.
- 5) *Other-* name and address of physician; if hospitalized, name and address of hospital, date of report, and name and position of person preparing the report.

10.3.2 These records must also be available without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act.

10.3.3 The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

11.0 SITE POSTINGS

11.1 The following forms will be posted for all on-going field projects. Contact your Regional Safety Department or local OSHA office to obtain these forms and postings.

11.1.1 Jacobs Forms: First Aid Register
Emergency Phone Numbers Specific to the Site

11.1.2 OSHA Forms: OSHA 200 Log
OSHA Health and Safety Poster (or State Equivalent)
Access to Medical and Exposure Records
OSHA Permits
Forklift Operating Instructions

11.1.3 Human resource forms and postings appropriate to each job site will be obtained from regional contacts and kept onsite as required. (See attachment J)

12.0 ATTACHMENTS

The following attachments are included with this SOP:

Attachment A	Primary Contacts
Attachment B	Authorization For Medical Treatment
Attachment C	Supervisor's Personnel Accident or Exposure Investigation Report
Attachment D	Witness Statement
Attachment E	OSHA Form 200 - Log and Summary of Occupational Injuries and Illnesses
Attachment F	OSHA Form 101 - Supplementary Record of Occupational Injuries and Illness
Attachment G	First Aid Register
Attachment H	Employee's Report of Occupational Injury or Disease
Attachment I	Vehicle Accident Reporting Procedure
Attachment J	Human Resources Contacts

PRIMARY CONTACTS**Corporate Environmental Health and Safety Department**

Jacobs Engineering Group, Inc.
600 Seventeenth Street, Suite 1100N
Denver, Colorado 80202
Attention: Terry Briggs
Office Phone: (303) 595-8855
FAX Machine: (303) 595-8857

Pasadena Risk Management (Safety) Department

Jacobs Engineering Group, Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: Pat Costamagna
Office Phone: (818) 578-6886
FAX Machine: (818) 578-6837

Central Region Safety Department

Jacobs Engineering Group, Inc.
4848 Loop Central Drive
Houston, Texas 77081-2211
Attention: Steve Pianalto
Office Phone: (713) 669-2200
FAX Machine: (713) 669-0045

Southern Region (Including Louisiana) Safety Department

Jacobs Engineering Group, Inc.
4949 Essen Lane
Baton Rouge, Louisiana 70809
Attention: C.J. Beysellance
Office Phone: (504) 769-7700
FAX Machine: (504) 768-5228

Northern Region Safety Department

Jacobs Engineering Group, Inc.
1880 Waycross Road
Cincinnati, Ohio 45240
Attention: Ken Wilkenson
Office Phone: (513) 595-7500
FAX Machine: (513) 595-7717

Western Region Safety Department

Jacobs Engineering Group, Inc.
251 S. Lake Avenue
Pasadena, California 91101
Attention: Jeff Wahl
Office Phone: (818) 449-2171
FAX Machine: (818) 578-6827
Home Phone: (805) 255-6973

JACOBS ENGINEERING GROUP INC.

(Division)**AUTHORIZATION FOR MEDICAL TREATMENT**

TO: Dr. _____ Address: _____ Date ____/____/____

This form signed by our representative is your authority to render treatment to:

(Employee)

in accordance with the provisions of and under the conditions prescribed by the ?Workmens' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier. Send your bill and report to us at the address listed below.

Authorized Representative

Date of Injury ____/____/____ Location _____ Job No. _____

How Injury Occurred _____

Please complete and return by mail to the following address to insure prompt payment of charges.

Pat Costamagna, Jacobs Engineering Group
251 S. Lake Avenue, Pasadena, CA 91101 (818) 578-6886

=====

FOR DOCTOR'S USE ONLY

Diagnosis of Injury: _____

Disposition of Patient:

☐ Occupational ☐ Non-Occupational ☐ Unable to Determine☐ Able to resume regular duties☐ Able to resume regular duties next workday☐ Able to resume restricted duties with the following limitations:☐ Unable to return to work, estimated length of disability: _____

Return for follow-up visit on ____/____/____ (Date)

(Doctor's Signature)

ATTACHMENT C

SUPERVISOR'S PERSONNEL ACCIDENT OR EXPOSURE INVESTIGATION REPORT

Employee _____ SSN _____ Job Title _____

Home Office _____ Division/Department _____

Client _____ Project Number _____

Project Manager _____ Site Manager _____

Location of Accident _____

Person To Whom Accident or Exposure Was Reported _____

Witnesses _____

Date & Time of Incident _____

Nature of Exposure or Injury? _____

_____Hospitalized ☐ Doctor Case ☐ First Aid Only ☐ Near Incident ☐

Body Parts Affected _____

Engaged in What Activity When Injured? _____

Weather Conditions _____

Chemicals Encountered _____

Form of Chemicals (liquid, solid, gas, vapor, mist, fume) _____

Describe Radiological Materials _____

Volume or Quantity Released _____

List/Describe All Personal Protective Equipment In Use By Person Exposed or Injured _____

Name of First Aid Provider _____ Phone Number _____

Name of Medical Service Provider _____ Phone Number _____

Name of Agency Reps. Contacted _____ Phone Number _____

Name of Client Reps. Contacted _____ Phone Number _____

Will Lost Time Occur? _____ How Long? _____ Date Lost Time Began _____

Name Any Other Persons Involved or Injured? _____

How Did the Accident Occur? _____

What Could Be Done to Prevent Recurrence of the Accident? _____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

Additional Comments or Information _____

Supervisor's Name Printed _____ Title _____

Supervisor's Signature _____ Date _____

Reviewer's Name Printed _____ Title _____

Reviewer's Signature _____ Date _____

H&S Officer's Name Printed _____ Title _____

H&S Officer's Signature _____ Date _____

IF THE SPACE PROVIDED ON THIS FORM IS INSUFFICIENT, PROVIDE ADDITIONAL INFORMATION ON SEPARATE PAPER AND ATTACH. THE COMPLETED ACCIDENT INVESTIGATION REPORT MUST BE SUBMITTED TO THE REGIONAL H&S MANAGER AS SOON AS PRACTICAL AFTER OCCURRENCE OF THE ACCIDENT.

Copies To: Regional H&S Manager, Corporate Environmental Health & Safety, Project Manager, Project File, Workers' Compensation Representative

WITNESS STATEMENT

DATE: 1/1

NAME: _____ TITLE: _____

SOCIAL SECURITY NUMBER: _____ - _____ - _____

TEMPORARY ADDRESS: _____ PHONE (____) ____ - _____

LOCATION AT TIME OF ACCIDENT: _____

DESCRIBE, TO THE BEST OF YOUR KNOWLEDGE, HOW THE ACCIDENT HAPPENED:

[illegible]

Signature

FIRST AID REGISTRAR 672

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THE USE OF THIS FORM IS REQUIRED UNDER THE PROVISIONS OF THE ALABAMA WORKERS' COMPENSATION LAW

Alabama
(Appendix)WCC Form 2
Rev. 1985STATE OF ALABAMA
EMPLOYER'S FIRST REPORT OF INJURY OR OCCUPATIONAL DISEASE

Send to: Your workers' compensation insurance carrier, in duplicate

OSHA CASE OR
FILE NUMBER

PRINT OR TYPE

Carrier's File No. _____

EMPLOYER	1. EMPLOYER'S NAME AND MAILING ADDRESS (No. & Street, City, County, State, ZIP)		LOCATION, IF DIFFERENT FROM MAILING ADDRESS		Do Not Write The Space Is For Employer's Carrier's SIC Carrier's Sec. Sec. Sex Marital Sta. Dependents Age Occupation Even On Premises Event Date Employer's Injury Source Accident Type Nature of Injury Part of Body Date of Death Stepped In Time Employee Time on Job Weekly Wage Report Date Report Recd. Back Case Closed
	TELEPHONE NUMBER				
	2. EMPLOYER IDENTIFICATION (U.C. ACCOUNT) NUMBER		3. CARRIER OR SELF-INSURANCE REGISTRATION NUMBER		
	4. NATURE OF BUSINESS (Manufacturing, Trade, Transportation, etc.)		SPECIFIC PRODUCTS		
EMPLOYEE	5. WORKERS' COMPENSATION PROVIDED BY: INSURANCE CARRIER () SELF-INSURANCE () GROUP FUND () IF INSURANCE CARRIER, GIVE NAME AND ADDRESS:				
	6. EMPLOYEE'S NAME (Last) (First) (Middle)		7. SEX MALE () FEMALE ()	8. AGE	9. SOCIAL SECURITY NO.
	10. EMPLOYEE'S HOME ADDRESS (No. & Street or RFD, City, County, State, ZIP)		11. MARITAL STATUS: SINGLE () MARRIED () DIVORCED () SEPARATED () WIDOWED ()		
	12. HOME TELEPHONE	13. REGULAR OCCUPATION		14. WORKING IN WHAT DEPARTMENT WHEN HURT	
INJURY OR ILLNESS	15. PLACE OF ACCIDENT OR EXPOSURE (Address or location, include County)			16. ON EMPLOYER'S PREMISES? YES () NO ()	
	17. Date of Occurrence	18. TIME OF DAY a.m. () p.m. ()	19. Date Disability Began	20. Date Employer Notified	
	21. DESCRIBE THE INJURY OR ILLNESS IN DETAIL AND INDICATE THE PART OF THE BODY AFFECTED. (e.g., amputation of right index finger at second joint, fracture of 2 ribs, lead poisoning, dermatitis of left hand, etc.)				
	22. IF FATAL, GIVE DATE OF DEATH				
	23. WHAT THING DIRECTLY PRODUCED THIS INJURY OR ILLNESS? (Name object struck against or struck by; vapor, poison, chemical or radiation; if strain or hernia, the thing being lifted, pushed, pulled, etc.; if injury resulted solely from bodily motion, the stretching, twisting, etc. which resulted in injury.)				
	24. HOW DID THE ACCIDENT OR EXPOSURE OCCUR? (Begin by telling what the employee was doing just before the accident or exposure. Be specific. If employee was using tools or equipment, or handling material, name them and tell what employee was doing with them.) (Now describe fully the events which resulted in injury or illness. Tell what happened and how it happened. Specify how objects or substances were involved. Give full details of all factors which led or contributed to the accident or exposure.)				
	25. NAME AND ADDRESS OF TREATING PRACTITIONER		NAME AND ADDRESS OF HOSPITAL HOSPITALIZED () OUT-PATIENT () EMERGENCY () TREATMENT ()		
	26. Has Injured Returned to Work? Yes () No ()		27. How Date	28. At What Wage?	29. At What Occupation?
	30. LENGTH OF TIME IN YOUR EMPLOY?		31. LENGTH OF TIME IN PRESENT JOB		32. NUMBER OF DEPENDENTS
	33. Average Weekly Wage		34. Weekly Value of Remuneration Other Than Wages (Food, Lodging, etc.) \$		35. DID EMPLOYEE RECEIVE FULL PAY FOR DAY OF INJURY? YES () NO ()
36. Date of This Report		37. Signed by		38. Signature	
				39. Official Position or Title	

VEHICLE ACCIDENT REPORTING PROCEDURE

1.0 Purpose

To set for the minimum requirements for the timely and accurate reporting of vehicular accidents.

2.0 Scope

This procedure applies to all Region operations and projects.

3.0 Responsibilities

- 3.1 Operations Managers are responsible for assuring that their respective department, project and other managers, and supervisors fully understand and comply with this procedure and any supplementary procedure(s).
- 3.2 All managers and supervisors are responsible for assuring that all employees reporting to them fully understand and comply with this procedure and any supplementary procedure(s).
- 3.3 Any employee involved in an accident while using a Jacobs pool car, rental car on company business, or other company owned, rented, or operated vehicle or heavy equipment, shall comply with this procedure and any supplementary procedure(s).

4.0 Requirements

- 4.1 Each office and project site shall develop a supplementary vehicle accident reporting procedure to address any applicable local and state requirements and/or client requirements.
- 4.2 At a minimum, the police will be notified and a police accident report filed for any accident involving another vehicle or property when damages are estimated to be greater than \$500.00 or when there is allegedly bodily injury (more stringent requirements by local, state or client shall be addressed by a supplementary office or project procedure).
- 4.3 All vehicle and/or equipment accidents shall be verbally reported to the Pasadena Risk Management Department and Western Region Safety Department (see Exhibit A) within 24 hours of the accident.
- 4.4 The employee assigned to the vehicle or equipment, or who holds the vehicle rental agreement, shall be responsible for completing and returning the following to the Pasadena Risk Management Department:
 - Cigna "Notice of Automobile Accident" (Exhibit B);
 - Copies of any completed local, state or client required forms.
- 4.5 If the vehicle involved in the accident is a Jacobs pool car, the employee assigned to the vehicle is responsible for obtaining two written estimates for repair of the Jacobs vehicle and obtaining a copy of the police investigation report (when applicable). All information is to be sent to the Pasadena Risk Management Department.

- 4.6 If the vehicle involved in the accident is a rental vehicle, the rental company will normally take care of the repair estimates. However, the employee shall be responsible for obtaining a copy of the police investigation report (when applicable) and forwarding a copy of the Pasadena Risk Management Department.
 - 4.7 All Jacobs vehicles that are non-driveable, due to an accident, are to be towed to the nearest garage that will hold them until further instructions are received.
 - 4.8 All questions regarding vehicle insurance shall be directed to the Pasadena Risk Management Department.
 - 4.9 In the event that the employee responsible for the vehicle is, due to the accident, unable to complete the foregoing requirements, it shall be the responsibility of the respective Operations Manager or his/her designate to do so.
- 5.0 Attachments
- 5.2 Exhibit B - Cigna "Notice of Automobile Accident"

JACOBS ENGINEERING GROUP INC.
AUTO ACCIDENT REPORT

Date of Accident _____ Time of Accident _____
Location of Accident _____

Driver of Company Vehicle

Name _____ Date of Birth _____
Address _____
Home Phone No. _____ Driver's License No. _____
License Number _____
Serial Number of Vehicle _____
Name of Other Passengers in Vehicle _____
Equipment Number _____

Driver of Other Vehicle

Name of Driver _____
Home Address of Driver _____
Phone Number Home _____ Work _____
Driver's License Number (Including State) _____
Employer _____
Owner of Vehicle _____
Serial Number of Vehicle _____
Make and Model of Car _____
Relation of Driver to Owner of Vehicle _____
Insurance Company of Owner _____
Insurance Company of Driver & Policy Number _____

Description of Accident -

Description of Damage to Vehicles

Company Vehicle _____

Other Vehicle _____

Place Where Damaged Vehicles Can Be Seen _____

Injuries (Explain) _____

Name of Law Enforcement Body Investigating Accident _____

Name, Address & Phone No. of Witnesses _____

Signature _____ Date _____

Job Name: _____ Job Number: _____

AUTOMOBILE ACCIDENT OR LOSS NOTICE

ESS, Inc.
a CIGNA company

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Approved by: *[Signature]*

EXHIBIT 3

CIGNA

CONTRACT #	NAME OR COMPANY	FILE NO. (ESIS/INA USE ONLY)
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LOCATION CODES			
1	2	3	4

(1) COMPANY	NAME	PHONE
	ADDRESS	

(2) TIME & PLACE	DATE & TIME OF LOSS OR ACCIDENT <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	LOCATION
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(3) AUTO USED OR OCCUPIED BY CLIENT MUST GIVE DRIVER'S AGE	YEAR	MAKE	MODEL	SERIAL NUMBER	MOTOR NUMBER	LICENSE NO., YEAR & STATE
	NAME OF OWNER			ADDRESS		<input type="checkbox"/> HOME <input type="checkbox"/> BUS. PHONE
	NAME OF DRIVER			ADDRESS		<input type="checkbox"/> HOME <input type="checkbox"/> BUS. PHONE
	RELATION TO OWNER (EMPLOYEE, ETC.)			WAS CAR USED WITH OWNER'S PERMISSION?		OTHER INSURANCE <input type="checkbox"/> YES <input type="checkbox"/> NO
	FOR WHAT PURPOSE WAS AUTO BEING USED AT TIME OF ACCIDENT					
	WHERE MAY AUTO BE SEEN (ADDRESS)?					ESTIMATED COST OF REPAIRS
	IF THEFT, SPECIFY PROPERTY STOLEN. IF COLLISION OR COMPREHENSIVE, SPECIFY DAMAGE					
	DATE, LOCATION & BADGE NO. OR NAME OF POLICE AUTHORITY TO WHOM ACCIDENT WAS REPORTED					

(4) DAMAGE TO PROPERTY OF OTHERS Use Additional Sheet If Necessary	OWNER			ADDRESS		<input type="checkbox"/> HOME <input type="checkbox"/> BUS. PHONE
	OTHER DRIVER — SAME AS ABOVE <input type="checkbox"/>			ADDRESS		<input type="checkbox"/> HOME <input type="checkbox"/> BUS. PHONE
	LIST DAMAGE, IF AUTO, MAKE YEAR, LICENSE NUMBER, YEAR & STATE					ESTIMATED COST OF REPAIRS
	WAS OTHER CAR INSURED? <input type="checkbox"/> YES <input type="checkbox"/> NO		NAME OF COMPANY & POLICY NUMBER			

(5) PERSONS INJURED					PASSENGER IN		EXTENT OF INJURIES
	NAME	ADDRESS	PHONE	AGE	CLIENT CAR	OTHER CAR	

For your protection California law requires the following to appear on this form. Section 556 of the Insurance Code reads as follows:

"It is unlawful to (a) Present or cause to be presented any false or fraudulent claim for the payment of a loss under a contract of insurance (b) Prepare, make, or subscribe any writing, with intent to present or use the same or to allow it to be presented or used in support of any such claim

Every person who violates any provision of this section is punishable by imprisonment in the State prison not exceeding three years, or by fine not exceeding one thousand dollars or by both

SEE REVERSE SIDE FOR ACCIDENT DESCRIPTION AND OTHER INFORMATION

DATE
E-1, J490 Pto. U.S.A.

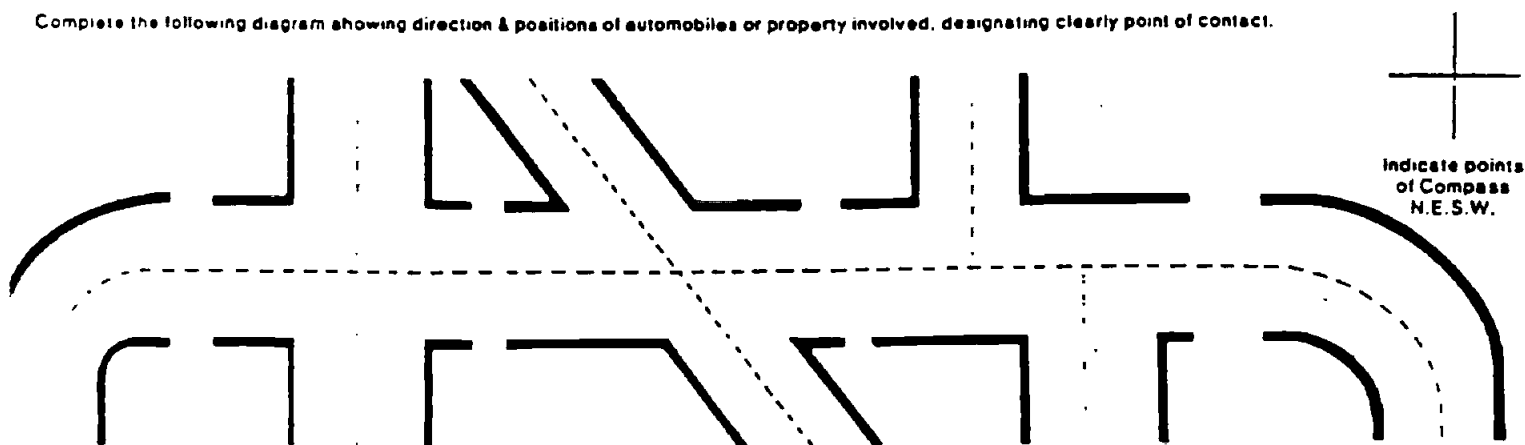
SIGNATURE OF CLIENT OR DRIVER

(6) NAMES AND ADDRESSES OF UNINJURED OCCUPANTS AND WITNESSES	OCCUPANTS OF CLIENT'S CAR	ADDRESS	PHONE
	OCCUPANTS OF OTHER CAR	ADDRESS	PHONE
			<input type="checkbox"/> HOME <input type="checkbox"/> BUS.
	OTHER WITNESSES OR PERSONS PRESENT	ADDRESS	PHONE
			<input type="checkbox"/> HOME <input type="checkbox"/> BUS.

(7) DESCRIPTION OF ACCIDENT

(8) AUTOMOBILE SEAT BELTS	INSTALLED IN CLIENT'S CAR (CHECK ONE)	USED AT TIME OF ACCIDENT (CHECK ONE)
	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
HELPFUL IN MINIMIZING INJURIES INCLUDING PASSENGERS (CHECK ONE)		
<input type="checkbox"/> YES <input type="checkbox"/> NO	EXPLAIN	

Complete the following diagram showing direction & positions of automobiles or property involved, designating clearly point of contact.



INSTRUCTIONS

GIVE STREET NAMES, DIRECTIONS AND LOCATIONS OF OBJECTS INVOLVED

- (1) Number each vehicle and show direction of travel by arrow → 1 2 ←
- (2) Use solid line to show path of each vehicle before accident → 1 dotted line after accident → 1
- (3) Show motorcycle or bicycle by → ○-○ (4) Show pedestrian by → ○ (5) Show railroad by |||||

2.4 VEHICLE ACCIDENTS

2.4.1 Reporting

- o An Auto Accident Form (Appendix 2-7) shall be kept in all Company vehicles utilized for offsite service.
- o The form shall be completed by the driver of the vehicle in conjunction with his Supervisor and the Project Superintendent and forwarded within 24 hours after an accident to the Corporate Safety Department.

2.4.2 Requirements

- o The report shall be filed when a Company vehicle is involved in any type of accident.
- o The form shall also be used in filing reports of accidents involving equipment vehicles (onsite or offsite) such as cherry pickers, backhoes, trucks, cars, etc.

2.4.3 Distribution

- o The report shall be distributed as follows:
 - Equipment Yard - 1 Copy
 - Site File - 1 Copy
 - Corporate Insurance - Original
 - Corporate Safety Department - 1 Copy

PRIMARY CONTACTS**Central Region Human Resources Department**

Jacobs Engineering Group, Inc.

4848 Loop Central Drive

Houston, Texas 77081-2211

Attention: R. Barry Rogers

Office Phone: (713) 669-2200

FAX Machine: (713) 669-0045

Southern Region Human Resources Department

Jacobs Applied Technology, Inc.

1525 Charleston Hwy.

Post Office Box 1327

Orangeburg, South Carolina 29115

Attention: Jerry D. Brezeale

Office Phone: (803) 534-2424

FAX Machine: (803) 534-2457

Northern Region Human Resources Department

Jacobs Engineering Group, Inc.

1880 Waycross Road

Cincinnati, Ohio 45240

Attention: John S. Kadash

Office Phone: (513) 595-7500

FAX Machine: (513) 595-7717

Western Region Human Resources Department

Jacobs Engineering Group, Inc.

2155 Louisiana, N.E. Suite 10,000

Albuquerque, New Mexico 87110

Attention: Maureen M. Mendez

Office Phone: (505) 888-1300

FAX Machine: (505) 880-2555

Corporate Human Resources Department

Jacobs Engineering Group, Inc.

251 S. Lake Avenue

Pasadena, California 91101

Attention: William Gebhardt

Office Phone: (818) 578-6886

FAX Machine: (818) 578-6837

APPENDIX K
Code of Safe Practices

CODE OF SAFE PRACTICES

- A. Following is the basic Code of Safe Practices that applies at all times to all work being conducted on this Project.
1. These safety rules are not inclusive, and all Federal and State safety regulations shall also be applicable.
 2. Where a conflict exists between a Federal, State, and/or other applicable safety rule, the more restrictive requirement shall be in force on the job site.
- B. This is a recommended format. It is general in nature and intended as a basis for the preparation of a code of safe practices by the contractor that fits his/her operation more exactly. As a minimum performance standard, it shall be adopted and enforced by each contractor performing construction work on this project.
1. Hard hats shall be worn at all times in construction areas.
 2. Sleeved shirts shall be worn at all times.
 3. Long pants shall be worn at all times.
 4. Leather shoes shall be worn at all times; no tennis or running shoes will be allowed.
 5. Adequate eye protection shall be worn when cutting, grinding, sawing or conducting any other activity that poses a potential eye hazard.
 6. Safety belts with lanyards shall be used at unprotected heights of more than 6'-0"; this includes working on a ladder when more than 6'-0" above the ground or floor.
 7. Hearing protection shall be worn when employees are exposed to noise levels requiring hearing protection as defined by Federal or State health and safety standards.
 8. Illegal drugs, alcohol, fire arms, or other dangerous substances shall not be allowed on the job site.
 9. Good housekeeping practices shall be maintained continually.
 10. Any time work is performed overhead, the contractor conducting such work shall erect a barricade.
 - a. The barricade shall consist of caution or danger barricade tape and appropriate warning signs.
 - b. All barricades shall be removed when not in use.
 - c. Contractor employees shall be required to honor the barricades erected by other contractors on the job site.
 11. All persons shall follow these safe practices rules, render every possible aid to safe operations and report all unsafe conditions or practices to the supervisor.

12. Foremen shall ensure that employees observe and obey every applicable Company, State, or Federal regulation and order as is necessary to the safe conduct of the work, and shall take such action as is necessary to obtain compliance.
13. All employees shall be given frequent accident prevention instruction. Instruction shall be given at least every five work days.
14. Anyone known to be under the influence of drugs or an intoxicating substance that impairs the employee's ability to safely perform the assigned duties shall not be allowed on the job while in that condition.
15. Horseplay, scuffling, and other acts which tend to have an adverse influence on the safety or well-being of the employees shall be prohibited.
16. Work shall be well planned and supervised to prevent injuries in the handling of materials and in working together with equipment.
17. No employee shall knowingly be permitted or required to work while his/her ability or alertness is so impaired by fatigue, illness, or other causes that the employee or others might be exposed to injury unnecessarily.
18. Employees shall not enter manholes, underground vaults, chambers, tanks, silos, or other similar spaces unless it has been determined that it is safe to enter.
19. Employees shall be instructed to ensure that all guards and other protective devices are proper and adjusted and shall report deficiencies promptly to the supervisor.
20. Electric cords shall not be exposed to potential damage from vehicles.
21. In locations where the use of a portable power tool is difficult, the tool shall be supported by means of a rope or similar support of adequate strength.
22. Only trained and authorized persons shall operate machinery or equipment.
23. Loose or frayed clothing, loose or hanging long hair, dangling ties, finger rings, etc., shall not be worn around moving machinery or other areas where they may become entangled.

24. Machinery shall not be serviced, repaired, or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.
25. Where appropriate, lock-out procedures shall be used.
26. Employees shall not work under vehicles supported by jacks or chain hoists without protective blocking that will prevent injury if jacks or hoists should fail.
27. Air hoses shall not be disconnected compressors until the hose line has been bled.
28. Excavating, trenching, and shoring operations shall be supervised by a "competent person" (refer to OSHA and/or Jacobs during all stages of field activity).
29. All excavations shall be inspected visually before backfilling to ensure that it is safe to backfill.
30. Excavating equipment shall not be operated near tops of cuts, banks, or cliffs if employees are working below.
31. Tractors, bulldozers, scrapers, and carryalls shall not operate where there is a possibility of overturning in dangerous areas like edges of deep fills, cut banks, and steep slopes.
32. When loading where there is a probability of dangerous slides or movement of material, the wheels or treads of loading equipment, other than that riding on rails, should be turned in the direction which will facilitate escape in case of danger, except in a situation where this position of the wheels or treads would cause a greater operational hazard.
33. Workers shall not handle or tamper with any electric equipment in a manner not within the scope of their duties, unless they have received instructions from a qualified, licensed electrician.
34. All injuries shall be reported promptly to the foreman and the Prime Contractor so that arrangements can be made for medical or first aid treatment.
35. No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or superintendent.

**ACKNOWLEDGMENT OF RECEIPT AND
REVIEW OF CODE OF SAFE PRACTICES**

TO ALL EMPLOYEES:

ATTACHED IS A COPY OF THE CODE OF SAFE PRACTICES. THESE
GUIDELINES ARE PROVIDED FOR YOUR SAFETY.

IT IS THE RESPONSIBILITY OF _____ TO
PROVIDE AND
(name of contractor)

REVIEW THIS CODE WITH EACH EMPLOYEE. IT IS THE EMPLOYEE'S
RESPONSIBILITY TO READ AND COMPLY WITH THIS CODE.

THE ATTACHED COPY OF THE CODE OF SAFE PRACTICES IS FOR YOU TO
KEEP. PLEASE SIGN AND DATE BELOW AND RETURN ONLY THIS PAGE TO

(name)

I HAVE READ AND UNDERSTAND THE CODE OF SAFE PRACTICES.

Date

Employee

Social Security Number

Signature

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE